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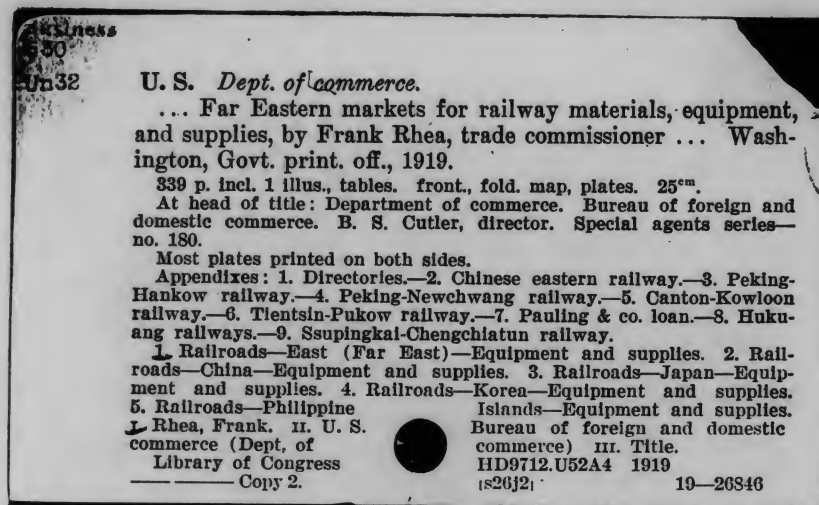
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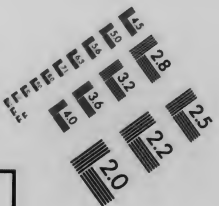


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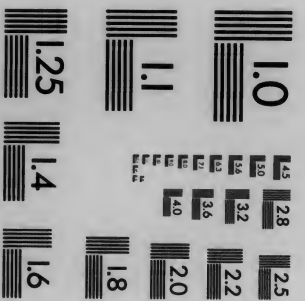
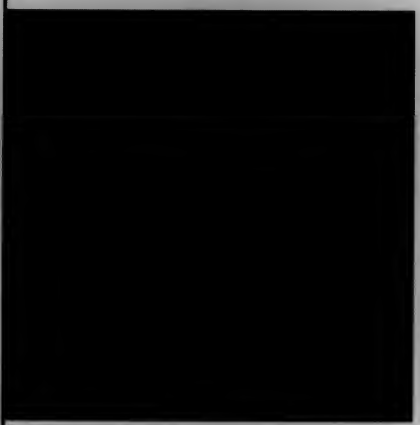
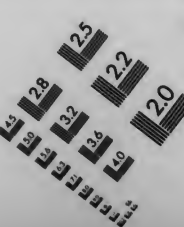
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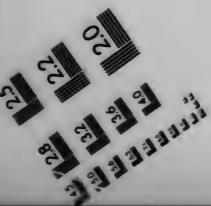
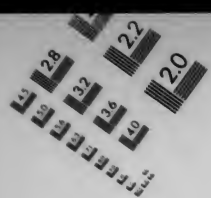
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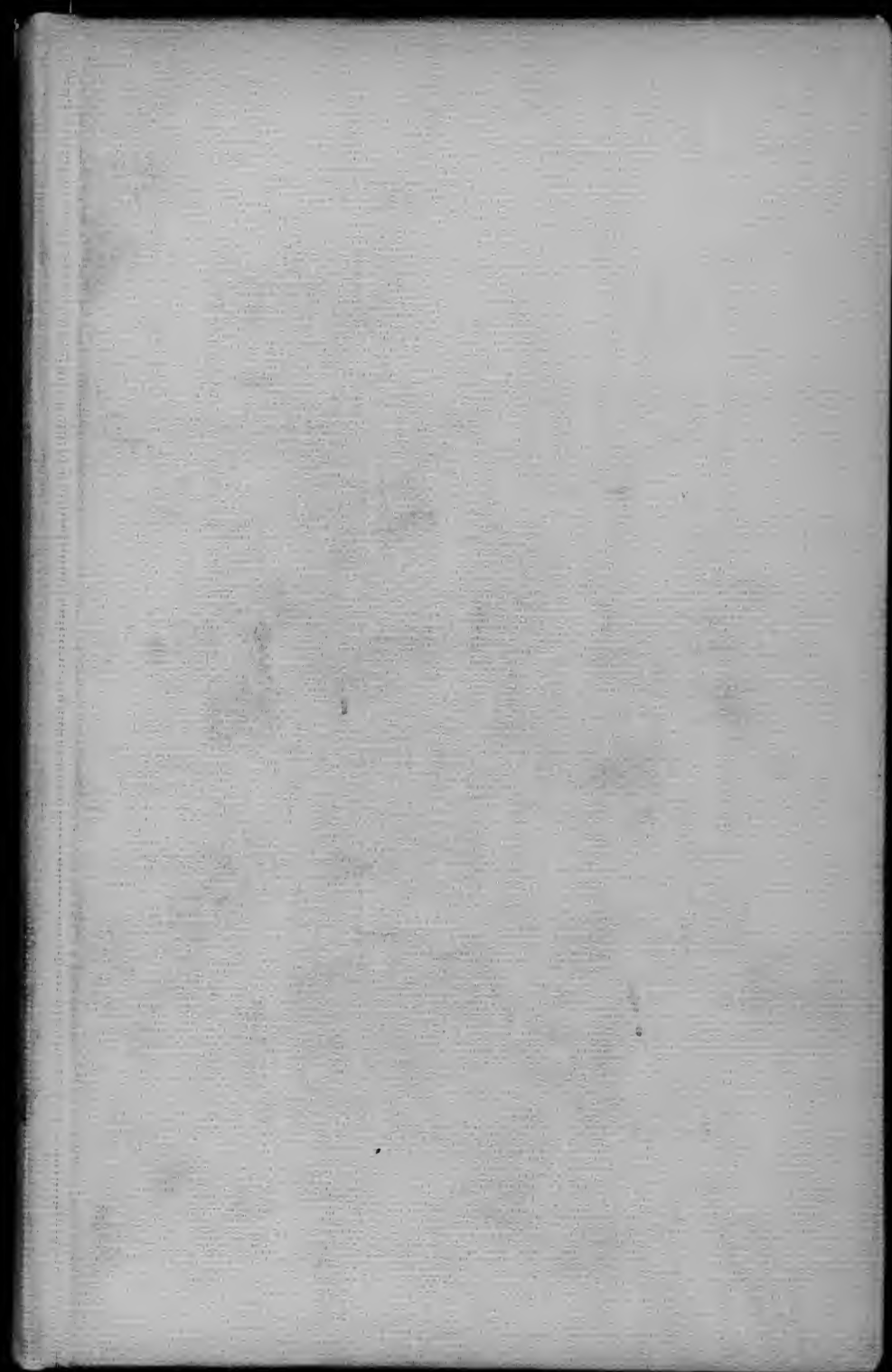


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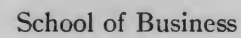
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FIG. 1.—CENTRAL STATION, TOKYO, JAPAN.

DEPARTMENT OF COMMERCE

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

B. S. CUTLER, Director

SPECIAL AGENTS SERIES—No. 180

FAR EASTERN MARKETS FOR RAILWAY
MATERIALS, EQUIPMENT, AND SUPPLIES

BY

FRANK RHEA

Trade Commissioner



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LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE,
BUREAU OF FOREIGN AND DOMESTIC COMMERCE,
Washington, June 2, 1919.

SIR: There is submitted herewith a report on the markets for railway materials, equipment, and supplies in China, Japan, Chosen (Korea), Manchuria, and the Philippine Islands, prepared by Trade Commissioner Frank Rhea. The information is in the same general form as that in Special Agents Series No. 156, "Railway Materials, Equipment, and Supplies in Australia and New Zealand."

On account of its present importance and future possibilities, China is taken up first, at length and in detail. Japan is considered second, although in the future that country is likely to be a competitor of the United States rather than a customer. Chosen is third and Manchuria fourth. Although the latter is Chinese territory, it has very close relations with Japanese and Korean railways and business enterprises. This is particularly true with respect to the activities of the South Manchuria Railway Co., which is managed under the auspices of the Japanese Government. The administration of that company is a branch of the Colonial Department of the Empire. The Philippine Islands appear last, though the situation there, in Mr. Rhea's opinion, is far from the least important.

Particular attention is given to the Chinese Government Railways, especially the possibilities of selling them rolling stock, of which these lines have an entirely inadequate supply at the present time.

The report is so arranged that it should serve as a ready-reference manual covering the railways of all these countries.

Respectfully,

B. S. CUTLER,
Director.

To Hon. WILLIAM C. REDFIELD,
Secretary of Commerce.

FAR EASTERN MARKETS FOR RAILWAY MATERIALS, EQUIPMENT, AND SUPPLIES.

Part 1.—CHINA.

INTRODUCTION.

In preparing this report on Chinese markets for railway materials, equipment, and supplies, it will be assumed that the reader is sufficiently informed concerning general conditions to warrant a somewhat cursory treatment of such features and a concentration of attention upon matters relating to transportation. At first it was not the writer's intention to take up the matter of the railway loan agreements as affecting the Chinese railway markets, but after a survey of all the factors in the situation it was decided (not without reluctance) that any report would be fundamentally lacking if such a discussion was not included. The consideration of this subject, however, is confined chiefly to the features that are believed to be interesting from the viewpoint of an engineer, with relatively little emphasis on the financial and diplomatic aspects.

The history of Chinese engineering and transportation is as engrossing as any other part of China's wonderful history. Without doubt, China at one time had the best general transportation facilities of any nation then existing, as is still evidenced by the remains of the caravan roads, the canals, and the examples of well designed and constructed masonry highway bridges—many now in excellent serviceable condition, though some of them are many hundred years old. As the writer ascertained by personal inspection, the Great Wall well deserves all that has been said of it as a monument of engineering, organization, and everlasting persistence.

Without question there have been great changes in recent years in the attitude of the whole population, especially regarding modern (or rather occidental) utilities. Instead of encountering opposition to these occidental innovations, one is now rather impressed with the search that is being made, particularly by the Chinese gentry, for means to overcome some of the handicaps growing out of the "Battle for Concessions," the "spheres of influence," and the loan agreements, and to insure an opportunity for China to develop along natural economic lines.

The statement seems fully warranted not only that the average man in the more important walks of Chinese life will assist in the development of China's many resources by introducing western improvements, but also that a great many of the more advanced thinkers are keenly dissatisfied with certain conditions that tend to restrain the progress of the nation.

If the nation is given the proper opportunity, and the present trend is not entirely upset, one seems justified in predicting that China will see greater changes than probably any other nation in the world in the next 25 years.

I. GENERAL INFORMATION.

GEOGRAPHICAL LOCATION AND AREA.

The southern limit of China is at about the twentieth degree of latitude, which is well within the tropical zone, and the northern limit of Manchuria is above the fiftieth degree, being in about the same latitude as the most southerly part of Hudson Bay.

The China Year Book for 1916 shows the area of all Chinese territory as follows:

	Square miles.
The 18 Provinces of China proper.....	1,532,800
The 3 Provinces of Manchuria.....	363,700
Mongolia.....	1,367,953
Tibet.....	463,320
Chinese Turkestan.....	550,579
Total.....	4,278,352

It is rather interesting to note that the average area of the 18 Provinces of China proper is 85,000 square miles, as compared with an average of 63,000 square miles for the 48 States of the United States. Szechwan, the largest Province, has an area of 218,530 square miles and Chekiang, the smallest, an area of 36,680, against 265,900 and 1,250 for Texas and Rhode Island, the largest and smallest of the American States.

The area of Manchuria is only 33,000 square miles less than the combined area of the four northwestern States of Washington, Oregon, Idaho, and Montana and only 3,000 square miles less than the area of our largest State, Texas, with Arkansas and Louisiana added. Manchuria has an area 25 per cent greater than either France or Germany.

CLIMATE.

China has all the varieties of climate that one finds in the United States from Florida to Montana.

The greater part of China, however, has a rainy and dry season somewhat comparable to that of the northwest coast of the United States. The seasons in China—in fact, in all the Far East—follow the movement of the sun much more closely than is the case in the eastern and central parts of the United States. In northern Manchuria the people say, with some truth, that they have only two seasons, summer and winter, with no real spring or autumn. This is accounted for by the changes in the prevailing winds, which occur at nearly the same time from year to year.

POPULATION.

An actual enumerating census, along the lines of those in occidental countries, has never been taken in China. The population of the 18 Provinces is variously estimated by the different authorities, the

figures ranging from less than 300,000,000 to more than 400,000,000. The Chinese customs authorities in 1910 estimated the total population of the 18 Provinces at 421,425,000 and of the 3 Provinces of Manchuria at 17,000,000. This population is densest along the seacoast and the navigable streams. In some places the only way to appreciate this density is actually to see it; no descriptions or illustrations that the writer had ever seen had given him an adequate conception of the facts. Farther in the interior the population is much less dense; in fact, many places are somewhat sparsely settled. An exception is the Province of Szechwan, on the upper stretches of the Yangtze River, which is quite densely settled; its area is about 218,530 square miles, and the Chinese customs authorities estimate its population at 78,700,000.

LANGUAGE.

While the Chinese literature of all parts of the country is written with the same characters, and can be read and understood by the educated Chinese, the pronunciation varies to such a degree that conversation can not readily be carried on by people of different sections. The "mandarin" is the dialect used by persons in official life.

It is the general policy of the large foreign commercial concerns in China to have young men entering their service take up the study of Chinese. The writer was surprised at the progress that some of these men had made at the end of two or three years; at the end of five years many of them apparently speak Chinese very well—at least they can carry on a conversation in Chinese without any noticeable effort. It seems well worth the effort of young or middle-aged men entering the service of commercial concerns in China to take up the study of Chinese, which undoubtedly will prove of great assistance to them in a business way.

WEIGHTS AND MEASURES.

It has been the purpose in preparing this report to avoid, so far as possible, reference to foreign weights, measures, and currency, and such units have been employed only where it was not practical to convert them to the terms used in the preparation of American railway data.

Distances and dimensions have in all cases been reduced to miles, feet, and inches, although much of the data secured was in metric measurements. In some of the references the Chinese "li" is mentioned. This seems to be a somewhat variable distance, but in general it may be considered equal to about 0.37 of a mile.

In some of the Chinese references, catties and piculs are mentioned; these are equal to 1½ and 133½ pounds avoirdupois, respectively.

CURRENCY AND FOREIGN EXCHANGE.¹

There are three principal kinds of currency in China—the cash, the dollar, and the tael. The cash is a small bronze coin, pierced in the center for stringing, which is familiar in this country as a curiosity. Though it is being superseded to a considerable extent by the frac-

¹ This section has been taken, for the most part, from Special Agents Series No. 172, "Electrical Goods in China, Japan, and Vladivostok," and Miscellaneous Series No. 70, "The Conduct of Business with China."

tional dollar currency, it is still the commonest coin, especially outside of the large ports, for small retail transactions in which the Chinese alone are concerned. It is almost never used by foreigners and does not enter into foreign trade. It is customary to reckon the cash as roughly equal to one-tenth of a Chinese cent, but its actual value is constantly fluctuating. It is independent of any gold or silver standard.

The dollar currency is the official circulating medium of China. The basic unit is a silver dollar, sometimes called the "Yuan Shi-kai dollar," adapted from the Mexican dollar and containing 0.779976 of an ounce of fine silver. According to the quarterly statement of the Director of the United States Mint with regard to the value of foreign coins, the Chinese dollar is equal approximately to 0.644 of a haikwan tael; therefore it is equivalent to 0.7174 of a Shanghai tael, at the official ratio between the two taels. (See paragraphs on the tael.)

The new dollar circulates freely and is becoming more and more the standard coin of the country, though it is still discounted in certain localities, especially in the south. It is indicated by the same sign (\$) as the United States dollar, and sums in United States currency are distinguished locally by the letter "G" (gold). The official Hongkong dollar is common in South China, and several other local dollars are in circulation. The word "dollars" is frequently applied in China to other currency units originally based on the Mexican dollar—even to the Indo-China piaster and the Philippine peso. In the district under Japanese control the Chinese dollar or its equivalent is sometimes called a "silver yen" (SY). Prices in silver dollars of any kind are usually quoted as "Mex." Wherever the term "\$ Mex." is used in the present report, the Chinese silver, or "Yuan," dollar is meant.

The national currency includes silver 20 and 10 cent pieces and bronze cents, which fluctuate independently of the dollar of which they are nominally fractions. This fractional currency is locally known as "small money," to distinguish it from the integral dollar currency, which is called "big money." As far as foreigners are concerned, the "small money" appears only in minor retail transactions; but it is necessary to understand the distinction because it usually exchanges with "big money" at a discount of 10 to 20 per cent of its face value. In the annual statement of a company operating a street railway in one of the treaty ports, a deduction of 20 per cent was made from gross earnings on account of the depreciation of "small coins."

The Chinese Government issues no paper currency, but the Government-controlled Bank of China and Bank of Communications issue notes, which are not at present freely redeemed in specie and circulate only at heavy discounts. The foreign-exchange banks issue in dollar currency notes that circulate at par in the locality where issued and at a small discount (usually about 2 per cent) in other parts of China.

The dollar currency is beyond doubt the coming standard of China, though the tael will continue to rule for a long time in commercial transactions. The dollar is now the medium for all cash payments in which foreigners are concerned, for most small personal bank accounts, and to an increasing degree for general retail business. It is used little in wholesale business and very rarely in foreign trade.

The tael is not a coin but a weight of silver of a given fineness. The weight of the haikwan, or Maritime Customs, tael is the same as the standard tael weight (1½ ounces), and its relation, fixed by treaty, to the other important taels, is as follows: 100 haikwan taels = 101.642395 kuping, or Treasury, taels, 105.215 Tientsin taels, and 111.4 Shanghai taels. One hundred kuping taels are equal to 109.6 Shanghai taels. The ratio of the haikwan to certain other commercial taels is fixed from time to time by the customs authorities. The haikwan and kuping taels are the only important ones distinguished by their use; for the other taels the distinction is mainly geographical, every important commercial center having its own tael.

As there are no coined taels, payments in this medium are supposed to be made in silver bullion, or "sycee." This is usually in the form of ingots of a peculiar shape known as "shoes," which weigh about 50 taels each. Between foreigners and Chinese firms, however, tael transactions are settled either by negotiable paper or by conversion into dollars. While this inconvenience is driving the tael out of use in cash and retail transactions, it is maintained as the standard currency of the country by the conservatism of the people, the influence of the great exchange banks, and uncertainty as to the purity of much of the silver in circulation.

The tael is not used in Hongkong and is less dominant in the trade of South China than in that of the center and north. The Government of Hongkong, moreover, restricts the circulation of dollar currencies other than its own.

The Chinese purchaser buys abroad for gold and sells his imported goods for silver. The gold values to-day are equivalent to a certain number of taels, while to-morrow they may be quite different. With this constant fluctuation in the number of taels that will be required to pay for a given amount of goods, the buyer is always on the alert to place orders when exchange is most in his favor. This is when the price of silver is high and imports are slack. When silver is high, the buyer can get more gold dollars for his silver money, and when there is no rush of imports there is no competition in exchanging silver for gold and no tendency to raise the price of gold through the run on the market. On the other hand, the exporter finds it the best time to sell when the opposite conditions prevail. Trade is therefore sympathetic to some extent with the variations in the exchange between silver and gold, which is fixed almost from hour to hour by the banks. A complicating feature is the fact that the local currencies fluctuate independently of international exchange, and local fluctuations may make it difficult to sell goods at a particular time in a given district.

For several years gold has been "cheap" in China, owing to the enormous purchases of silver by the warring nations and to the drop in the world's production during recent years, caused by the disturbances in Mexico. So far as exchange only is concerned, the last few years have been favorable to the purchase of goods abroad; but purchases have been somewhat limited by other factors, such as extremely high prices, delayed deliveries, and uncertainty as to the continuance of the high exchange. The trade of China, under the complex war conditions, has been generally prosperous; but in the long run it has

been found that a low exchange rate is more favorable to an active foreign trade because the Chinese obtain the money to purchase foreign goods from the sale of Chinese products for export. Normally, therefore, a high exchange rate limits exports and thereby indirectly limits imports.

When foreign goods are purchased, the Chinese buyer or the importing house enters into an exchange contract with a bank in the port of importation, which acts as agent for that bank in the country of origin to which the documents covering the purchase are hypothecated. These contracts are usually arranged by exchange brokers. If the contract calls for the purchase of goods at a price in gold, the buyer usually pays for the goods on a c. i. f. basis and, in addition, pays the interest on the draft and the profit of the importing house. Contracts made at a silver price often stipulate that the importing house is to look after the bank and other charges. In such cases the price that is paid by the Chinese buyer includes the importer's profit and the interest on the draft, and the goods are said to be sold on a c. i. f. c. i. basis; i. e., cost, insurance, freight, plus commission (more properly, profit) and interest. Both methods are common; the practice varies with the importance of the transaction and the nature of the goods.

The fluctuations in exchange make it difficult to state accurately in United States currency domestic prices in China, local costs of production, etc.

The following table shows the average exchange rates of Shanghai taels and silver dollars for 1912 and 1913, and for each month from January, 1914, to March, 1918. Actual quotations for the silver dollar for this period are not available; the rates given were obtained by multiplying the Shanghai tael by 0.7174:

Years and months.	Shanghai taels.	Silver dollars.	Years and months.	Shanghai taels.	Silver dollars.
1912.....	\$0.66	\$0.473	1916:		
1913.....	.66	.473	January.....	\$0.612	\$0.443
1914:			February.....	.62	.447
January.....	.621	.447	March.....	.64	.459
February.....	.622	.449	April.....	.68	.491
March.....	.63	.453	May.....	.74	.534
April.....	.64	.461	June.....	.69	.501
May.....	.62	.450	July.....	.66	.475
June.....	.61	.441	August.....	.70	.506
July.....	.56	.407	September.....	.72	.523
August.....	.55	.399	October.....	.73	.528
September.....	.56	.405	November.....	.79	.568
October.....	.53	.380	December.....	.83	.591
November.....	.53	.386	1917:		
December.....	.54	.390	January.....	.82	.590
1915:			February.....	.85	.614
January.....	.543	.390	March.....	.80	.579
February.....	.54	.388	April.....	.83	.598
March.....	.55	.398	May.....	.84	.606
April.....	.55	.399	June.....	.85	.631
May.....	.55	.398	July.....	.91	.657
June.....	.54	.394	August.....	1.00	.722
July.....	.53	.383	September.....	1.15	.827
August.....	.52	.379	October.....	.95	.684
September.....	.53	.383	November.....	.97	.698
October.....	.54	.394	December.....	1.00	.724
November.....	.57	.412	1918:		
December.....	.60	.433	January.....	1.03	.739
			February.....	1.02	.734
			March.....	1.02	.734

No attempt will be made in the present report to convert silver dollars to United States currency or any other equivalent; this is considered impracticable on account of the constantly changing price of silver, which has varied greatly in the last few years. A person doing business in China soon learns (of necessity) to think in terms of "Mex." currency. *Unless otherwise indicated, the \$ sign in the Chinese sections of this report means Chinese silver currency.*

With special reference to the railway situation, it may be well to revert for a moment to the subject of depreciated currencies. The earnings of the steam railways are not affected by the "small" silver coinage or the "copper cent," since their charges are based on the "large" money. To support the paper issues of the Bank of Communications and the Bank of China, both of which have been at a heavy discount, these issues have been accepted for some time by some of the railways at their face value in payment for fares and freight charges. But in paying interest charges and expenses the railways have had to bear this discount loss, which has had quite an appreciable effect on the earnings of the lines north of the Yangtze River. However, as this was an expedient to assist the Government in supporting these issues, it is felt that it need not be considered as a permanent feature of the railway earnings. The tramways promptly reduce their "small money" and "copper cents" to a "large" money basis.

AGRICULTURE AND PASTORAL PURSUITS.

China is primarily an agricultural country, and the wide range of climate, the rich soil, and the simple wants of the people make it one of the few countries in the world that can, if necessary, be self-supporting. The products are very varied. Rice is the principal crop and staple food in South and Central China, but in the colder parts of North China millets very largely take the place of rice. One of these, known as kaoliang, provides a food substitute for rice and is the principal fodder crop, while the stalks and roots are one of the principal sources of domestic fuel. Wheat is a secondary crop but is growing in importance.

Where transportation is available special crops are being raised, with much success in many instances—for example, soya beans in Manchuria, potatoes along parts of the Peking-Suiyuan Railway, peanuts along the Peking-Hankow Railway, and tobacco along the Shantung Railway.

While the cultivation in many instances is what might be called intensive, the methods are very simple and the implements almost primitive, usually necessitating a great amount of human labor. One feature that is particularly noticeable is the wide areas usually under cultivation with no fences whatever. The Chinese apparently do not believe in wasting good material for such a purpose as separating one another's crops, but, rather curiously, they close in their low-built dwellings with high mud or brick walls, doubtless as a means of protection.

Pastoral pursuits in China are entirely secondary to agriculture, although in the aggregate the products are very considerable, particularly from the interior regions in the form of hides, wool, and hair. The marketing of some of these articles involves a large amount of transportation and will mean a considerable source of railway freight, as is illustrated by the traffic over the Peking-Suiyuan line at present.

MINERAL PRODUCTION.

COAL

China, no doubt, has very large, varied, and valuable coal resources, but it is difficult to obtain definite data concerning them. The Japanese have thoroughly proved the fields they control in South Manchuria, at Fushun, Yentai, and Penchihiu. The Fushun field on the Fushun Branch of the South Manchuria Railway, 236 miles north of Dairen, contains about 800,000,000 long tons and carries a high percentage of nitrogen, and there is a very complete Mond gas plant, producing a considerable amount of ammonia. The Yentai field near the main line of the South Manchuria Railway, about 225 miles north of Dairen, contains a much smaller quantity of steaming coal. These two fields are controlled by the South Manchuria Railway and are both equipped with modern apparatus; with a total of approximately 20,000 employees, they are now producing about 2,225,000 tons a year.

The Penchihiu field, 47 miles from Mukden on the Antung Branch of the South Manchuria Railway, while limited as to quantity, contains some very good coking coal. This is of much importance to the Japanese interests in connection with the two 150-ton iron furnaces at Penchihiu, the two new 250-ton furnaces of the South Manchuria Railway at Anshan, about 190 miles north of Dairen, and the new iron plant at Pingyang on the Korean Railways in Korea. The coal, iron-ore, and limestone deposits and the iron furnaces at Penchihiu are controlled by the Okura Co., of Japan, and the present coal production is about 300,000 long tons a year.

The only other instance in which the writer was able to see data proving the quantity and quality of the coal was that of the Kaiping field, controlled by the Kailan Mining Administration, which is located on the main line of the Peking-Mukden Railway about 80 miles northeast of Tientsin. Here there is a proved amount of about 1,000,000,000 long tons of first-class coal, a considerable portion of which will coke. With about 20,000 men the present production is approximately 3,250,000 tons a year, with a production of about 100,000 tons of coke now produced by the Chinese process. It was stated by a well-informed authority that the Kailan Mining Administration contemplates improvements amounting to approximately \$10,000,000 United States currency in the way of washing and by-product processes, these improvements to be undertaken as soon as possible after the end of the war. The greater part of the coal now exported from China proper comes from this field, and the average rail haul to Chinwangtao, the principal coal-exporting port, is about 75 miles. This is the only port of North China on the Gulf of Chihli that is free from ice during the long winters of this section, except Dairen, which is under Japanese control.

The next largest producing mines are the Pinghsiang collieries of the Han-Yeh-Ping Iron & Coal Co., in Kiangsi, about 260 miles southwest of Hankow. The annual production is about 1,000,000 tons, and all the fuel and coke for the Han-Yeh-Ping Iron Works at Hanyang, near Hankow, come from these mines.

There is no doubt of the fact that extensive and valuable fuel deposits occur in many parts of China, particularly in Chihli, Shansi, Honan, and Kiangsi, but so far as could be learned none of the fields

other than those mentioned have been conclusively proved up as to quantity and quality. The best statement of the recent production situation was published in the Far Eastern Review for October, 1917. As this publication prepares its data with much care, the following information is given substantially as printed. The total present coal production of China from all classes of mines is about 18,000,000 tons, of which about 8,000,000 tons come from the larger mines where more or less modern methods prevail and which are, in the main, under foreign control or administration. According to figures collected by the Geological Survey of China for the year 1915, the most recent year for which figures are available, the output of the principal mines was as follows:

Name of mining enterprise.	Location.	Province.	Nationality.	Production in long tons.
Kailan Mining Administration.....	Tangshan-Kaiping.	Chihli.....	Sino-British.....	2,971,792
Pinghsiang Colliery.....	Pinghsiang.....	Kiangsi.....	Chinese.....	927,463
Peking Syndicate.....	Chaotso.....	Honan.....	British.....	480,875
Lincheng Coal Mining Administration.....	Lincheng.....	Chihli.....	Sino-Belgian.....	259,703
Chungshing Coal Mining Administration.....	Yishien.....	Shantung.....	Chinese.....	244,825
Tsingching Mining Administration.....	Tsingching.....	Chihli.....	Sino-German.....	179,154
Paoching Co.....	Yangchuan.....	Shansi.....	Chinese.....	131,396
Luhokou Coal Mining Co.....	Luhokou.....	Honan.....	do.....	91,822
Tungshing Co.....	Mentowkow.....	Chihli.....	Sino-British.....	80,000
Subtotal.....				5,367,030
Fushun Colliery.....	Fushun and Yentai.	Manchuria.....	Japanese.....	2,034,856
Penchihiu.....	Penchihiu.....	do.....	do.....	275,777
Total.....				7,677,663

In addition to the above, the Japanese military administration mined 259,611 tons in 1915 and 443,368 tons in 1916 from the mines along the Shantung Railway, and it was expected by the Japanese authorities at Tsingtau that this amount would be increased in 1917 and again in 1918. In the above-mentioned article the rather surprising statement was made that even now China is importing from 1,000,000 to 1,600,000 tons and that in normal times there would be an excess of imports over exports. Even with the present railways, if adequate equipment and arrangements were provided, there is every reason to think that China should become an exporter of coal instead of an importer. It would appear that many of the developments have not had the possible measure of success because the proving was insufficient to determine the best scheme of development. This applies particularly to the matter of drainage, which has been the cause of trouble in many of the operations.

IRON.

It is reasonably certain that China also has important iron-ore deposits, but the obtaining of definite information regarding the proving data was found to be even more difficult than in the case of the coal resources.

The October issue of the Far Eastern Review also referred to the iron and steel production of China, stating that at present the total pig-iron production of China, aside from Japanese production in Manchuria, is about 300,000 tons. One-half of this is the output of

the Han-Yeh-Ping Co. at Hankow; the remainder, produced by scattered native plants, is nearly all consumed locally.

The Han-Yeh-Ping works consist of two 100-ton and two 250-ton furnaces, but at present one of the 250-ton furnaces is not being operated, on account of lack of power. In addition, there are in course of erection two 400-ton furnaces near Hwangchow, about 70 miles below Hankow, on the Yangtze River. These last furnaces are on the river at the point where the ore is brought from the Tayeh mines by means of a 2-foot-gauge railway. At present about 250 tons a day are converted into steel and iron products, and all the rest of the pig iron goes to the Japanese. This plant has the only rail mill in China, the maximum capacity of which is 120 tons a day. It is understood that there is a Japanese loan to the Han-Yeh-Ping Co. amounting to \$12,000,000 (gold), the principal and interest of which is to be paid in 40 years in iron ore and pig iron. This loan arrangement for the pig iron is at the price of \$21 (gold) per ton of 2,240 pounds for the 40-year period. It is estimated that the present production cost is \$18 (gold) per ton. The loan agreement also provides that 2 tons of ore go to Japan for every one that is smelted by the Han-Yeh-Ping Co., and the minimum amount going to Japan is estimated to be 1,000,000 tons a year.

The two 150-ton Penchiu furnaces of the Okura Co. (Japanese) are now producing about 70,000 tons a year, and the new Anshan plant of the South Manchuria Railway is expected to have the first 250-ton furnace completed and in blast before the end of 1918 and the second 250-ton furnace before the end of 1919. The production from both these plants, as well as that from the new Pingyang plant, in Korea, which may use both fuel and ore from Penchiu, is controlled for Japanese consumption. As soon as the work can be carried out it is planned to install a complete steel plant at Anshan, particularly for the production of plates for shipbuilding, of which Japan is in such urgent need and anxious to have its own supply. In any event, all the production that can reasonably be expected in the next few years will fall far short of taking care of the combined needs of China and Japan, even when one includes all the possible production in Japan proper.

OTHER METALS.

China is said to produce in commercial quantities 26 different minerals, of which antimony ranks first in value. As with the coal and iron resources, there is great and urgent need for scientific investigation of these mineral deposits, so that they can be properly and successfully developed. The transportation of minerals other than coal and iron is at present of no considerable volume and is not likely to influence materially the building of new lines of railway; rather, the building of new lines will influence the development of certain of these mineral resources, which in some cases is now much handicapped on account of slow or expensive transportation.

GENERAL MANUFACTURING.

Notwithstanding what appear to be very slow, primitive, and expensive methods of transportation, there is a great amount of native manufactured articles that are somehow gotten to ports for

export. A good illustration of the peasant products is straw braid from North China, particularly Shantung, which is exported in considerable quantities from Chefoo, to which port it is transported by Chinese methods. A good example of a community product is chinaware at Kiukiang, on the Yangtze River, where quantities are manufactured by native methods much in excess of the local needs. Such examples of native manufacturing can be noted in many parts of China.

The manufacturing in China of distinctively foreign articles is constantly becoming more important from year to year, and, on account of the vast supply of cheap labor and the adaptability of the Chinese, there is every reason to believe that China, in the course of time, will become a most important source for many lines of products requiring a large amount of labor. The number of modern cotton mills is probably most noticeable, but other lines that warrant attention are cement, sugar, flour, etc.

RAILWAY MANUFACTURING.

The Chinese railways have in most instances reasonably well-equipped workshops, but these are primarily for the purpose of making all classes of repairs to rolling stock in order to insure a very long life—this being the general policy of all railways in the Far East, as in Australia. The exceptions to the general rule that workshops are only for repairs are the Tangshan workshops of the Peking-Mukden Railway, which are laid out for erecting locomotives, passenger and freight cars, and the Shanhaikwan bridge works of the same railway, which were arranged for the fabrication of new bridges and all kinds of structures. Both of these works followed British practices, and it unquestionably was the purpose to build all rolling stock and fabricate all bridges and structures for new as well as existing Chinese Government railways. This condition has not prevailed in the past, and one seems warranted in concluding that it will not in the future. In the writer's opinion, if the present tendencies continue these works need not be given serious consideration, although this may seem very inconsistent with what is said in this same connection regarding the Japanese workshops at Dairen (Shakako) in South Manchuria.

It has been assumed that the Han-Yeh-Ping Iron Works would furnish all the rail required for both the existing and the new lines of Government railways in China, but as this company's maximum rail production is only about 30,000 tons a year and there has been a constant demand for much more iron and steel than the total production of this plant, this expectation has not been realized and probably will not be in the future.

Much the most important manufacturing plant from the standpoint of American manufacturers of railway equipment and fabricated structural materials is the Shakako shops of the South Manchuria Railway Co., near Dairen. This is a well arranged and equipped modern manufacturing plant rather than a railway workshop for the repairing of rolling stock. About two-thirds of the present products are other than for the use of the South Manchuria Railways. As an illustration of the products, it may be mentioned that all the materials for the extensive buildings erected by the Japanese in South

Manchuria during the last three years have been fabricated at these works, the materials for the new 150-ton blast furnace at Penchihu have been handled there, and the materials for the two 250-ton blast furnaces and steel plant at Anshan will be furnished from these works. Meter-gauge locomotives have been designed and built for the Yunnan line of the Indo-China Railways. The 4 locomotives, 10 passenger cars, and 60 freight cars for the Ssupingkai-Chengchiatun Railway (nominally a Chinese Government line being constructed with borrowed Japanese capital) are all being built at these works. For the past three years all the new rolling stock and also to a great extent that for the Korean railways have been erected in these works, and there is no doubt that this will continue to be the case in the future. In the past the greater part of the equipment for these two lines was bought in America, frequently through Japanese companies, such as the Mitsui Bussan Kaisha. These works, no doubt, will also furnish all rolling stock and structural materials required by the Kirin-Changchun line connecting with the South Manchuria Railway at Changchun; this line, although a Chinese Government line, is now under Japanese control as a result of recent loan agreements. These same remarks apply to requirements for any extensions of this line, which may be very considerable, as explained later.

The total number of employees at these works was approximately 4,150 in July, 1917; of these 72 per cent were Chinese, none of whom were employed in administrative, technical, or clerical positions, or as engineers, cranemen, or similar employees, but entirely as artisans and laborers. These Chinese workmen make unusually good molders in iron foundry work, and they also are unusually good brass workers. It is said that on an average 250,000 Shantung laborers cross the Gulf of Chihli annually from the ports of Shantung to South Manchuria and scatter over the country, following agricultural pursuits, and that the Japanese now recruit these men from this source for the manning of their various enterprises in Manchuria, such as these workshops, the labor on the docks at Dairen, the Fushun, Yentai, and Penchihu coal mines, and the new steel plant at Anshan. The Shantung man is probably the most robust and upstanding of any of the Chinese proper; he is, for example, one of the best stonemasons in the world. The utilization of the cheap and plentiful Chinese labor by the Japanese in Manchuria is a very interesting subject on which much might be said, but it is thought that the above is sufficient to point out the possibilities in this general connection. In support of the statement as to the cheapness of this Chinese labor, one may mention the fact that on account of the recent high price of silver the daily wage of the Chinese laborer at the Fushun mines was raised from 25 Japanese sen (12.5 cents gold) to 30 sen (15 cents gold).

II. CHINESE COMMERCE.

GENERAL CONDITIONS.

A traveler in China studying the transportation problem soon perceives that Chinese commerce is of very considerable volume and of very great variety. He wonders how it is all accomplished with the present transportation methods and he will probably conclude, if he stays long enough, that the problem is really beyond the full comprehension of the occidental mind.

With improved transportation facilities, Chinese commerce would greatly increase, as is shown by the traffic over some of the present railways, which, with increased and improved facilities, would show an even larger volume of business.

There has always been a large trade between the various Provinces of China in the native manufactured products, and there is now a growing commerce in manufactured products of foreign character.

IMPORTS AND EXPORTS.

China's total imports for the year 1917 were valued at \$565,032,460 United States currency, of which \$61,937,831, or 10.96 per cent, came from the United States. For the same year the total exports were valued at \$472,190,262, of which \$96,681,954, or 20.48 per cent, went to the United States.

While in the aggregate this looks large, when it is considered on a per capita basis for China it is seen to be very small and there is every reason to think that it will be much increased in the future. In the past the imports have included a moderate amount of materials and equipment for transportation purposes, and while it is difficult to pick out the actual amount of business, there really has been more than could reasonably have been expected in view of the restrictions of the loan agreements that are mentioned later.

Chinese requirements for transportation materials and equipment are certainly going to be very considerable in the future, and a large amount of this business should come to American manufacturers if developments are allowed to proceed in accordance with the best interests of China's transportation needs. China's transportation can be handled better with equipment conforming to American practice than with that which follows the lines of continental practice, as is well illustrated on the South Manchuria and Korean Railways.

LIKIN.

There is imposed on the interprovince and native commerce a tax called likin, which is unquestionably retarding the development of China's internal trade as well as putting an unwarranted restriction on the natural movement of traffic, particularly over the present railways. To an extent, at least, this tax helps the foreign trader who imports his goods, since he is allowed to pay this tax by a nominal ad valorem duty as he ships his goods to the various interior points from the open port, while the native trader has the substantial handicap of numerous inland impositions of this likin, causing much inconvenience as well as additional indirect expense and loss. That the

imposition of these taxes as now applied is a very serious matter in connection with the development of Chinese railways and general business is very fully explained by Dr. C. C. Wang, managing director of the Peking-Hankow Railway, as a conclusion to a series of articles on Chinese railways published in the Chinese Social and Political Science Review and republished in the December, 1917, number of the Far Eastern Review. The following is what Dr. Wang says on this subject:

Since likin only taxes the trader, one may question why we should advocate its abolition in connection with railway finance. The reason is that likin barriers bother the trader directly and hinder the railway indirectly. Railways, we may say once for all, depend upon the trader. What hurts the trader immediately hurts the railroad eventually. Therefore, in order to insure the prosperity of the railroad, one must endeavor to remove the difficulties which lie in the way of the trader. Generally speaking, there is hardly any other institution that is retarding the development of railway traffic more seriously than the imposition of likin along the railways. The difficulty does not lie so much in the amount which is collected as it does in the delay and damages, the cost of paying the taxes, and other inconveniences which arise from these collections. Indeed, the costs of the trader in paying his taxes are often more than the taxes themselves. The reported corruption, extortion, and purposely committed damage to goods by the likin collectors upon helpless traders are too notorious to need emphasis. When these facts are taken into account, it is really a credit to our traders that they can still survive.

But without going further into the question, we feel it safe to say that the abolition of such barriers will not only meet with the hearty welcome of the honest trader, but will as well prove a boon to the commerce of the whole country. And it is by the development of our commerce that our railways may earn more money, thus preparing to meet the approaching financial difficulties. What is lost by the abolition of likin will be more than made up by the increase of railway revenue. To make up the loss of funds of the Ministry of Finance resulting from this abolition, the Government can easily require the railways to credit the Ministry with a lump sum every year equal to the likin revenue derived from railway traffic, which the railways are probably willing to do. By so doing, the Government will have everything to gain and nothing to lose. So it is safe to say that this is one of the very few reforms which will bring benefit to all and harm to none. The only people that will suffer from this reform will be the likin runners, and it is very likely that they will raise every opposition.

The competition between our commerce and industry and those of other countries also demands the removal of the likin obstacles along the railways. In this regard we have to remark that not only the customs tariffs but also all state railways, and to a certain extent even private railways, in other countries invariably make special efforts to help domestic industry. Germany, Belgium, Switzerland, France, Japan, etc., are some of the most obvious instances where customs and railway tariffs are well known to have been used to protect home industry, and their results are justifying their practice. But we have been following a diametrically different policy. Instead of helping our home commerce and industry by showing them favors, we obstruct them in their uphill struggle against foreign competition and place them at a great disadvantage by subjecting them to the numerous inland impositions while exempting the foreign competitors. For it is only imported goods that can be transhipped to any open port in the country upon paying a nominal ad valorem duty at the port of entry, while there is no way open to the home trader by which he may avail himself of similar immunities. This is not only harmful, but unjust and absurd; and it alone is enough to prevent our trade and industry from catching up with those of our competitors, to say nothing of the numerous other serious disadvantages which our industry has to face in its uphill struggle. Inasmuch as we are restrained from raising or adjusting our absurd customs tariffs, we have no other way to help our home industries than to place them on a fair basis with foreign competition by removing the obstacles resulting from inland taxes.

TARIFFS.

China is one of the very few countries where, so far as import duties are concerned, goods from all sources are treated on the same basis. There are no preferential duties. There is supposed to be

a uniform tax of 5 per cent on all imports, but in many cases there are specific duties that amount to less than 5 per cent ad valorem. A commission has recently prepared a revision of the Chinese customs tariff, with the object of making the specific duties more nearly equivalent to 5 per cent ad valorem, but this has not yet gone into effect.

The above statements should not be understood as indicating that there are no preferential conditions in the import markets of China, as this would be far from the facts of the situation. To the interests controlling shipping, terminal, godown (warehouse), and other transportation facilities, there are very substantial advantages. In China, moreover, there are a number of very unusual features in this connection; for example, China is one of the few large nations, if not the only one, that permits other nations to handle coastal shipping and, more particularly, shipping on inland waters. The control of this coastal and inland-waters shipping and the facilities that go with it constitutes, to say the least, a very great advantage to the trade of the interests associated therewith.

TREATY PORTS.

When a port or trade center is thrown open by treaty or proclamation to foreign trade and residence, it is known as a "treaty port" or "open port." This may be a seaport in the ordinary sense of the word or it may be an inland trade center many miles from the seacoast. The first five treaty ports were opened by the treaty of Nanking in 1842; they were Shanghai, Canton, Amoy, Foochow, and Ningpo. Since then, the number has been increased until there are now about 80, covering the greater part of the country, particularly along the seacoast and the Yangtze Valley. The most important from the standpoint of markets for transportation materials and equipment are probably Shanghai, Tientsin, Hankow, Dairen (Japanese leased territory), and Canton. The British leased territory of Hongkong, of course, is a very important business center and a reshipping port for all parts of South China, French Indo-China, and the Philippine Islands.

Peking is also an important business center, but while there are a great many foreign residents and business concerns outside the Legation Quarter, it is not a treaty port.

CONCESSIONS AND SETTLEMENTS.

Concessions and settlements are described by Dr. Tyau as follows: (1) "A concession or piece of ground conveyed by deed of grant in perpetuity to a lessee State for a residence of its nationals, the same to be administered by it 'saving the sovereign rights of the Emperor of China,'" and (2) "a settlement, or site selected for the residence of all foreigners, within which they may organize themselves into a municipality for certain purposes and be governed by their elected representatives."

Outside of its participation in the administration of the municipality of Shanghai and the Legation Quarter of Peking, the United States has no concessions or foreign settlements in China.

TRADE LAWS.

Consular jurisdiction, extraterritoriality, concessions and foreign settlements in treaty ports, railway area concessions, railway treaty loans, and a number of other matters make China a rather unusual place in which to live and do business. Dr. V. K. Wellington Koo's "Status of Aliens in China" and Dr. M. T. Z. Tyau's "Treaty Obligations Between China and Other States" are both interesting reading to students of this subject and form very handy reference works for foreigners residing and doing business in China. It is probably true that these publications are written from the Chinese viewpoint on many of the points in controversy, but they are certainly reliable as regards information and, in addition, are good examples of the feeling of many of the educated Chinese concerning their present position and condition.

TRADING CENTERS.

The order of importance of the several trade centers from the standpoint of imports, exports, and shipping is probably as follows: Shanghai, Hongkong, Hankow, Tientsin, and Canton. Dairen, of course, is a very important port, but the Japanese "sphere of influence" in all of South Manchuria puts this trade center in a class by itself. The same remarks apply to Tsingtau. Both these ports have unusually good harbor facilities.

It should be remembered that Peking is the political center of China, and particularly that this is the headquarters of the Ministry of Communications, the branch of the Chinese Government in control of the railways and the postal, electrical, and shipping departments. It can fairly be said that there is a growing tendency to control purchases for the various lines of the Government railways through the Ministry of Communications, and it is quite probable that in time all general contracts for materials and equipment for these lines will be handled from Peking.

Shanghai, at present, is the largest importing and exporting center, but Hankow may in time justify its title of the "Chicago of China," on account of its growing importance as an exporting center, and, particularly, its proximity to the source of supply of many of the exported products.

INDUSTRIAL CENTERS.

At present the industrial centers are, in general, largely the same as the trade centers, but a forecast of future development is far beyond the scope of the writer's investigation. It seems natural to conclude, however, that this development will follow past precedents and that localities having the natural advantages of ample labor, fuel, and shipping materials (such as the neighborhood of the port of Chinwangtao) will see important developments in the future. Hankow, no doubt, will become one of the very important points, although this place will be somewhat handicapped by the fact that the Hupeh man is not nearly so robust and capable of standing hard work as the laborers from some other parts of China. Pukow, on the Yangtze River, is suggested as one of the points having considerable advantage from the standpoint of railway and shipping facilities.

III. GENERAL TRANSPORTATION CONDITIONS.

PRIMITIVE MEANS OF TRAVEL.

It is probably true that the ordinary means of transportation in vogue to-day in China represent in general more primitive methods than those of any other country, not excepting India. The traveler on land can be conveyed by horse, sedan chair, cart, wheelbarrow, mule, litter, camel, jinrikisha (drawn by coolies), or he can walk.

Commodities are carried by wheelbarrows, carts, pack horses, mules, donkeys, oxen, camels, and, to a very surprising extent, by vehicles drawn or carried by human beings. One of the early objections to railways was that they would produce unemployment among the multitude of people employed in transportation pursuits, but even these classes seem now to appreciate that the railways increase the opportunity for this kind of labor—and at rather better wages than formerly prevailed. Persons interested in primitive transportation can certainly find a most interesting field of study from one end of China to the other.

A Chinese horse or mule—somewhat undersized—carries from 250 to 325 pounds, depending somewhat on the bulk. Camels carry probably 50 per cent more, but are used only in the north. Wheelbarrows carry from 250 to 400 pounds, but seldom make more than 16 miles a day and frequently less. Carts carry varying loads, depending on the number of coolies, mules, donkeys, or Chinese horses drawing them. The combinations of donkeys, coolies, mules, etc., that are seen from place to place drawing vehicles are never ending. At Kalgan the writer photographed, very much to the displeasure of the Mongol driver, a camel hitched to a cart—an unusual combination even for this part of China, which is most interesting from a transportation standpoint.

CHARACTER OF CHINESE HIGHWAYS.

China's reputation for bad roads and streets is quite deserved. In the south, where wheelbarrows are most used, the paths are uniformly bad. In the central and northern parts of the Republic, some even of the most important highways are bad almost beyond description, but in other places roads were seen that were quite passable. In the past, many of these highways were substantially built and probably well maintained, as is evidenced by the really good bridges. The writer noted especially the bridge at Kalgan, over the Yang River, a branch of the Han River. This bridge is undoubtedly very old but is in good condition. The mortar appears to be pure lime, with no sand or other materials as a filler. This bridge forms part of what has been for many centuries one of the most important caravan routes of the world. The traffic from Kalgan to Peking is now practically all carried by the Peking-Suiyuan Railway. The two principal caravan routes from Kalgan are, one to the northwest to Urga and one to the west to Suiyuan. The latter will be replaced by the Peking-Suiyuan Railway, upon the completion of the line

from Fengchen to Suiyuan, which is now under construction. There is no wheeled traffic over this old caravan road, everything being carried by pack animals.

In some of the cities of North China, the writer saw considerable work in progress in the streets. This was particularly the case in Peking, where some very substantial work was being carried out. A movement for the building of better roads appears to be getting under way, and one of the stimulating influences is the great delight manifested by the Chinese in running any kind of an automobile that they are able to acquire. There is a good deal of modern road-making machinery in China, particularly one make of British steam road roller, and there is likely to be a very considerable demand for highway building materials and machinery in the course of the next few years.

THE GREAT WALL.

In connection with the above caravan road passing through Nan-kow Pass, it seems proper at this point to mention the Great Wall of China. The Peking-Suiyuan Railway follows the same gorge as the caravan road, and passes under the ridge of the West Hills only a few hundred feet from the gate where the caravan road passes through the wall. The wall in this vicinity is very substantially built, and although it is doubtless many years since repairs have been made, much of it is still in surprisingly good condition. All the mortar seems to have been pure lime, with no sand or other filler.

COASTAL CARRIERS.

With such a large population living along the seacoasts and navigable rivers, there has naturally grown up a very extensive coastal shipping business. A number of these companies have been very profitable. The principal ones are under the British, Japanese, Chinese, and French flags—this order representing their relative prewar importance.

The carrying of Chinese products, as well as foreign goods, between treaty ports on the Chinese coast by ships under the flags of foreign nations is the only instance in the world in which such a considerable percentage of a large coastwise traffic is carried in foreign bottoms. In other countries this business is usually reserved exclusively for the ships of the country. In many instances the foreign control of Chinese shipping facilities has a very great influence in causing the business to go to the countries controlling the shipping.

RIVER AND CANAL CARRIERS.

The many navigable rivers, particularly the Yangtze, and the great number of canals (many of them small streams canalized) have, throughout historic times, borne a large volume of traffic. The Chinese junk, which is much the same to-day as it was centuries ago, seems capable of navigating all kinds of watercourses, from the high seas to canals through highly cultivated areas where the junks sometimes present the appearance of moving through grain fields on wheels. A number of the same strong companies that carry on the coastal shipping also have fleets on the navigable rivers, particularly the Yangtze, and here again one finds the very unusual

arrangement of foreign bottoms carrying native products as well as foreign goods on this inland waterway. In all other important countries aliens are excluded from such business. That these coastal and inland water carriers are real competitors for business is shown by the low freight rates that the Shanghai-Nanking Railway has to grant to attract business between Shanghai and Chinkiang and Nanking.

Without question, it would be to the great advantage of China as a whole, and in the end to the interest of most of the holders of the treaty loans, if all future construction of transportation facilities were carried out as part of a comprehensive scheme for the entire country; and in the planning of such a complete system careful consideration should be given to the fullest possible utilization of these waterways. Particular attention should be given to this matter in connection with the proposed construction of competing railways that are not likely to pay.

DEVELOPMENT OF CHINESE RAILWAYS.

HISTORICAL SURVEY.

INTRODUCTION.

The history of the Chinese railways dates back to 1863. Mr. P. H. Kent (British), in his carefully prepared book "Railway Enterprise in China," divides the development into three periods—first, from 1863 to 1878; second, from 1879 to the Chino-Japanese war in 1894; and third, from that time until the preparation of his book in 1907. Mr. M. C. Hsu (Chinese), in his equally well-prepared study "Railway Problems in China," divides the development into three different periods—first, from 1863 to the Chino-Japanese war in 1894; second, from 1895 to the Russo-Japanese war in 1904 (this period marked by the "Battle for Concessions"); and third, from 1905 until the date of his book, 1915.

For students of Chinese railway history, the above-mentioned books will be found very interesting. The former probably provides the best presentation from a fair British standpoint and the latter the best from a fair Chinese viewpoint. Mr. Kent characterizes his divisions thus: First, "foreign attempts to persuade the Chinese to allow the introduction of railways;" second, "movements emanating from Chinese interests;" and third, the "era of concessions with the features of foreign control." The principal feature of the second period was the building of what is now the Peking-Mukden Railway between Tientsin and Shanhaikwan, but the Chinese interests had very substantial foreign direction and engineering assistance—principally British. This line was built very largely in connection with the development of the Kaiping coal field, now consolidated under the Kailan Mining Administration. Mr. Hsu's division seems best suited to a study of the Chinese railway markets and will accordingly be followed.

PERIOD FROM 1863 TO 1894.

All authorities agree that the first railway proposed in China was a line from Shanghai to Soochow, the proposal taking the form of a petition under date of July 20, 1863, from 27 foreign firms to Li

Hung Chang, then governor of Kiangsu. The petition met with decided disapproval and the project was finally dropped.

The next incident was a proposal for the construction of a comprehensive system of railways throughout China proper, prepared and presented to the Manchu Government in 1864 by Sir MacDonal Stephens, a distinguished British engineer who had for about 20 years been prominently connected with the railways in India. The proposal was based on his view that "a comprehensive system decided on at the outset—all lines to be made in conformity with it—would avert the evils of the English want of such a system, where in many cases double capital has been laid out to perform work which one expenditure could have adequately provided for, seriously prejudicing the shareholders on both lines, and depriving the public of the full, economical advantage which under a sound, organized system would have obtained." There was then, as now, no room for difference of opinion as to the correctness of his basis, though there might be some question as to the correctness of the locations of his system. The facts probably are that had his proposal been accepted and carried out, with China retaining actual control, under the guidance of effective foreign direction (as in the case of the Maritime Customs and the later Salt Gabelle Administration), the progress of China as a whole would have been much enhanced, and the nation would not be confronted with the unfortunate complications, in the shape of railway treaty loans, that now restrain its development.

Sir MacDonal Stephens, by virtue of his credentials and high professional standing, was accorded an attentive hearing, but his proposals were never acted on by the Chinese authorities, whatever consideration they may have had. China thus failed to derive advantage from invaluable advice such as probably no other nation ever had at such an opportune time—proposals that would have benefited not only the railway situation but the entire industrial development of the country.

The first railway actually built in China was a line of 2-foot 6-inch gauge from Shanghai to Woosung, a distance of more than 12 miles. This line was first proposed in 1865, but because of a series of delays it was not finally completed until December, 1876. There is considerable difference of opinion regarding the circumstances in connection with the construction of this line, but, whatever the facts are, the result was that the Chinese authorities purchased the rights of Jardine, Matheson & Co. and other interested parties and, on final payment of purchase money on October 20, 1877, service was discontinued, the track was torn up, and the material and equipment were shipped to the island of Formosa, where apparently no use was made of them.

The next incident was the building in 1878 of 7 miles of a mule tramway in connection with the development of the Tangshan Colliery. This was the beginning of the most successful railway built thus far in China. The primary object of this tramway was to transport coal from these mines for the use of the China Merchants Steam Navigation Co., the director general of which was then a very able Chinese named Tong King Sing, who has not been given due credit for his efforts in advancing the industrial development of China. Li Hung Chang was then viceroy of Chihli, and instead of opposing the project he lent his powerful influence in favor of it. Tong King

Sing ably forwarded the building of this line by his assistance and influence. Mr. R. R. Burnett (British) was chief engineer, and early in the development Mr. C. W. Kinder (British) was made resident engineer. Mr. Burnett retired in 1882; Mr. Kinder then became chief engineer and retained the position for many years, during the developments leading up to the present Peking-Mukden Railway system. It was, no doubt, largely because of his foresight and resourcefulness that this line was not built on a narrow gauge. He appreciated the vast importance of the wider gauge and to-day China has at least one factor in its railway development for which to be thankful, namely, the almost complete uniformity of gauge. This result is probably due, to a large extent, to Mr. Kinder's action on this initial line. Although this first line was clearly authorized as a mule tramway and the use of other motive power was prohibited, Mr. Kinder, recognizing that success meant the use of steam, made his plans from the first with that in view. The first locomotive was homemade and was known as "The Rocket of China."

In 1882 extensions were undertaken; the project then became known as the Kaiping Railway Co., and Mr. Wu Ting Fang was made general manager. While these developments met with much opposition and many discouragements, one addition after another was made until, at the opening of the Chino-Japanese war in 1894, the line was completed and in operation between Tientsin and Shanhaikwan, a distance of 174 miles, and an additional 40 miles northeast of the latter point was under construction and nearing completion. Surveys had also been made for a distance of about 160 miles of a proposed extension to Kirin, the capital of the Province of Kirin, in central Manchuria, about 450 miles from Shanhaikwan.

The results of the war and the "Battle for Concessions" rendered impracticable such extensions under Chinese control.

PERIOD FROM 1895 TO 1905.

The second period might be divided into two parts. First, the contest to secure railway concessions was one of the chief features of the "Battle for Concessions" waged from the close of the Chino-Japanese war until the Boxer uprising in 1900. "Spheres of influence" were marked out and claimed during this time. The second part of this period was marked by the diverging interests of some of the powers during the Boxer uprising, particularly the efforts to secure control of the Peking-Mukden line and the extension of this line into the Chinese part of the city of Peking. This was followed by what might be called the policy of consolidating these concessions.

PERIOD FROM 1906 TO 1911.

While progressive Chinese saw the need of railways in China, before either the Chino-Japanese or the Russo-Japanese war, this realization became much more potent after the latter war and has resulted in a very general desire among all classes of Chinese to see the construction of railways carried out in all parts of the country.

The period beginning with the year 1906 may also be divided into two parts—first, from 1906 to Mr. Sheng Hsuan-huai's advancement to the presidency of the Ministry of Communications in January, 1911, and second, from that date to the present writing. During

this first interval much interest was manifested by the provincial authorities, many efforts were made to raise money among the Chinese, and a number of concessions were granted to provincial organizations to build lines, particularly in Hupeh and Honan. In general, however, these efforts did not accomplish any material results. The Board of Communications, which is now known as the Ministry of Communications, and will be so referred to hereafter, was created by Imperial Edict November 6, 1906, to control the railways, posts, telegraphs, and telephones. Mr. Tsen Chun-hsuan, when president of the Ministry of Communications in 1907, petitioned the Throne, recommending that China's railways be brought under unified management, but no action resulted. During this period the central Government was negotiating the Hukuang Railway Loan (that is, the "Loan of Four Nations," England, Germany, France, and the United States), but each Province was desirous of building its own railways, as many thought that in this way the several sections of China would secure the large profits that were expected to accrue. Grand Councilor Chang Chih-tung formulated a scheme that at the time seemed likely to satisfy both the provincial authorities and the central Government—a plan that might have prevented the revolution and possibly saved the Manchu Dynasty—but his death in October, 1909, left no one to conclude this settlement. It should be added that his plan, while it might have prevented or deferred some of China's trouble, would hardly have afforded an ultimately satisfactory solution of Chinese railway problems. The end of this first period found China's authorities much divided, with intense feeling between the central Government and the various provincial organizations, and with the Powers pressing their demands for the conclusion of the Hukuang Railway Loan.

DEVELOPMENT IN RECENT YEARS.

The second part of this period has witnessed one advance after another, so that, notwithstanding the great political changes that have occurred during this time, China to-day has on the whole a well-crystallized working arrangement for the nationalizing of its railways, particularly when one considers the many difficult obstacles that have had to be overcome and the discouraging restrictions connected with some of the railway loans.

Mr. Sheng was raised to the presidency of the Ministry of Communications in January, 1911. He was one of China's foremost men of this period. He had had extensive business and administrative experience; he was one of the largest stockholders of the China Merchants Steam Navigation Co. and the Han-Yeh-Ping Iron and Steel Works, manager of the China Merchants Steam Navigation Co., the Pinghsiang colliery and railway, the Tayeh iron mines, and the Han-Yeh-Ping iron and steel plant, director of Government telegraphs, administrator general of the Peking-Hankow Railway, and vice president of the Ministry of Communications. Mr. Sheng was highly regarded by both the Peking authorities and the Chinese gentry, and his ability was recognized by foreigners and natives alike. However, after he had put through measures that went far to solve some of China's railway difficulties, there arose a storm of objections from various sources, particularly from the Chinese gentry, resulting in the confusion of revolutionary occurrences in 1911. He was dismissed

on October 26, 1911, was escorted by detachments from the legations to Tientsin, escaped to Tsingtau, and later went to Japan, where he died in 1916. His first actions early in 1911 were to negotiate loans for £2,000,000 and £500,000 and next to contract with the Four Nations banking group for £10,000,000. On the announcement of these loans, the people became much excited and the last loan was never actually floated.

Mr. Sheng realized that China must have a settled and continued railway policy. He apparently decided that a strong centralized organization was the proper one to adopt. He then proceeded to carry out his conclusions, with the result to himself above mentioned. With support of Prince Ching's cabinet he obtained the approval of the Throne, and on May 9, 1911, a most important Imperial Edict was issued, proclaiming in part as follows:

After careful and repeated deliberations, the conclusion is reached that the Nation must possess a complete system of trunk lines to and from the four quarters of its territory in order to administer the Government by a grasp on the central pivot. * * * Therefore, we desire to proclaim explicitly to the world that all the trunk railways shall be State-owned; this shall be the fixed policy. Trunk railways in the Provinces that were under private management by companies established before the third year of Hsuan Tung (1911) and that have been delayed in construction shall immediately be taken over by the Government as State-owned, and their building work shall be pushed on with energy. With the exception of the branch railways, which shall continually be allowed to be undertaken by the people according to their ability, all permission for trunk railways formerly granted shall be canceled. With regard to the details of the manner of taking them over, let the Ministers of Finance and of Communications and Posts gravely obey this decree and devote their whole attention to devising the fulfillment of it.

This was followed by action to take over the Canton-Hankow and Szechwan-Hankow lines, then in the hands of organizations of the Chinese gentry for financing and construction. This was very shortly followed by the announcement of the signing of the Hukuang Railway Loan. These actions caused much excitement, and vigorous protests were made, particularly against the settlements proposed in return for the expenditures made on the projects named above. The Government, through Mr. Sheng as president of the Ministry of Communications, followed the nationalizing policy with firmness and showed no signs of changing the policy in the face of the impending crisis. To support this action, troops were moved into the disturbed districts; this further excited the people, with the ultimate result that Szechwan passed from agitation to revolt, shortly followed by Hupeh and Hunan. The avowed revolutionists and constitutionalists eagerly grasped this as their long-awaited opportunity, and the revolt rapidly spread to all parts of the Yangtze Valley, with the ultimate fall of the Manchu Dynasty and the establishment of the Chinese Republic. The assertion that the revolution was caused by the policy to nationalize the railways and the concluding of the Hukuang Railway Loan is probably an overstatement of the basic facts, but those certainly were the incidents over which the factions joined issue. It is interesting to note that the policy of nationalization has been carried through to a measurable degree by the Republican Government, and it is extremely doubtful whether this would have been done had the Manchu Dynasty survived.

The policy of the Provisional Government in power from the later part of 1911 to the middle of 1913, the period between the First and Second Revolutions, was to retain for the central Government all

the borrowing powers. This was strongly opposed by the provincial interests, as it was during the former period, and was one of the principal causes precipitating the Second Revolution in July, 1913. During this time, President Yuan Shi Kai empowered Dr. Sun Yat Sen to organize a national corporation to finance and construct future railways for the Chinese Government. This resulted in the organization of the Chinese National Railway Corporation, with Dr. Sun as director general and Mr. George Bronson Rea, of the Far Eastern Review, as technical secretary. A system of railways approaching 10,000 miles in length and extending to all parts of the country was proposed to be financed and constructed on a program of from 10 to 15 years, contemplating an expenditure of some \$500,000,000 (gold). When Dr. Sun was implicated in the Second Revolution, President Yuan annulled his powers as director general and dissolved the corporation. One substantial result of this incident was the negotiating and signing of an agreement with Pauling & Co. (Ltd.), of London, for the construction of the Canton-Chungking line, which was transferred in July, 1914, to the Shasi-Shingyifu line with little modification. This agreement, as representing the type of railway loan granting the most favorable terms to China, is referred to at length farther along in this report, under the heading of "Railway agreements."

Since the establishment of the Republic after the Second Revolution, notwithstanding the lack of funds, the many changes in officials, and the discouraging restrictions of the railway loan agreements, very considerable further progress has been made in nationalizing the Chinese railways except the concessioned lines. At the present writing, nearly 3,700 miles of line are, so far as the loan agreements will permit, under the control of the central Government through the Ministry of Communications. This does not include two branch lines in Manchuria amounting to 130 miles, now practically under Japanese management, although nominally Chinese Government lines. There is also nearly 3,000 miles contracted for construction through loan agreement, and this will probably be added to in the course of time. This does not include a considerably larger mileage proposed and claimed as under agreement by several of the Powers; while much of this will probably be built in the course of time, the agreements, no doubt, will be much modified before the lines are undertaken. The objections of the Provinces have either been overcome or have disappeared to a large extent; they probably will not obstruct progress in the future, particularly if the needed railways are built—which seems to be the chief concern at present. During this period, however, on account of the lack of funds and other conditions, there has been a constant tendency to complicate matters by making further loans on any available asset, and this has been and is now a constant handicap, hindering progress along the best lines. Some examples of these loans are those on the Nan-Shan (Kiangsi) Railway, the Pinghsiang colliery, the Tayeh iron mines, and the Han-Yeh-Ping iron works of the Han-Yeh-Ping Co., and the later instances of the long-time loan on the Kirin-Changchun Railway and the short-time loan on the Peking-Suiyuan Railway. Most of these loans are in foreign hands, and in some instances are held to the considerable disadvantage of China's future development.

Regulations have been issued from time to time that have improved the situation. One of the very creditable achievements has

been the working out and adoption by all the Government lines of a very excellent system of uniform accounts, which will be referred to later.

SPHERES OF INFLUENCE.

"Spheres of influence" or "spheres of interests," as they are called, were established as the result of the "Battle for Concessions." One of the principal objects sought was the granting of concessions for building and operating railways. The United States has never made any claims for a "sphere of influence" but has consistently contended for the maintenance of the "open door" for all, with opportunity for China to develop as a whole.

The difficulties encountered by the Siems-Carey projects, and a further study of conditions prevailing in the country, will show the great obstacles in the way of China's developing a comprehensive system of its own railways, particularly if not carried out with exclusively Chinese capital. The history of the Tientsin-Pukow Railway—the northern part built with German capital, materials, and equipment and the southern part with British capital and different materials and equipment—is alone sufficient to demonstrate the character of existing conditions.

The claimants for concessions have insisted on the right to furnish capital in their spheres of influence for any projects undertaken by the Chinese for which other than Chinese capital is used. Restrictions have varied all the way from the simple provision just mentioned to long-time leases for portions of territory, with concessions for the claimant nation to build and operate railways, including zones under the police and business control of the lessor; in some instances these concessions have carried the right to develop and operate other resources such as coal and iron mines, as is the case in Shantung and Manchuria.

A number of Chinese authorities claim that the principal cause for the Boxer uprising was the opposition to the granting of concessions during this period, particularly to the course followed by the Germans in Shantung and the Russians in Manchuria. There are grounds to support this belief. The Shantung man is the most vigorous of the Chinese people and at least the equal mentally of any of the others. A large number of these Shantung men yearly go to South Manchuria. The people where the uprising originated thus came in contact with the new railways and the rigorous handling of the natives which, it is claimed, occurred in both instances. Contrary to the opinion sometimes entertained, the knowledge of such conditions spreads with surprising rapidity among all classes of the Chinese. In this connection it was interesting to find that Chinese newspapers are published in many parts of China, and many of these are quite as sensational as some of the extreme publications in Occidental countries. It is probably true that the two most striking occurrences in recent Chinese history—the Boxer uprising and the fall of the Manchu Dynasty, followed by the establishment of the Republic of China—were largely precipitated by the railway concessions and loans.

RAILWAY MAP OF CHINA.

Opposite this page is a map of the railways of China, showing their relation to other systems. This appeared in the Far Eastern

Review for February, 1919, and therefore presents a thoroughly up-to-date view of the situation with respect to the lines actually in operation.¹

CLASSIFICATION OF EXISTING LINES.

The total railway mileage of all classes of lines in all parts of China at present is slightly more than 6,500 miles. This does not include street railways or tramways, which will be referred to later. These railways can be divided into two general classes—first, loan-built railways owned or controlled by the Chinese; second, "concessioned" or foreign railways that have been built with foreign capital and are now subject to foreign control and operation.

The Chinese railways can again be divided into four groups, as follows: First, the Chinese Government railways, under the direction of the Ministry of Communications; second, private (stock-owned) railways; third, provincial railways; and fourth, industrial railways, usually owned by the industries served. The foreign railways were all built for strategic or political reasons, and at the time of their construction their commercial utility was a matter of secondary importance. Both the South Manchuria and Shantung railways have assumed in recent years much importance commercially; this is also true of the Chinese Eastern Railway and will be increasingly so regardless of what the developments may be in Russia proper.

Following is a tabulation of all the Chinese railways, following the above classification. This table shows the English name, the generally used Chinese name, the miles of line, the gauge of the track, the source of the capital, and the Provinces in which the railways are located. A special effort was made to include practically all the commercial railways in China. The mileage given in most cases was taken from the annual reports for the railways themselves or from data obtained from the Ministry of Communications, but in a few instances the mileage shown has been approximated. At present 28 miles of line of 2-foot 5-inch gauge are being constructed in Yunnan to connect with the French Yunnan line at Pechechi, and a further extension of this line, for a distance of about 45 miles, is contemplated. This line is being built to develop tin mines at Kotcheou.

GROUP NO. 1: CHINESE GOVERNMENT RAILWAYS.

English name of railway.	Chinese name of railway.	Miles of line.	Gauge.		Source of capital.	Provinces in which railway is located.
			Ft.	In.		
Peking-Mukden.....	Ching-Feng.....	600	4	8½	Anglo-Chinese.....	Chihli and Sheng-king.
Peking-Suiyuan.....	Kin-Sui.....	292	4	8½	Chinese.....	Chihli and Shansi.
Tientsin-Pukow.....	Tsin-Pu.....	638	4	8½	Anglo-German....	Chihli, Shantung, Kiangsu, and Anhwei.
Peking-Hankow.....	Kin-Han.....	814	4	8½	Franco-British....	Chihli, Honan, and Hupeh.
Shansi.....	Cheng-Tai.....	151	Meter.		Franco-Belgian....	Chihli and Shansi.
Tao-kow-Chinghua.....	Tao-Ching.....	95	4	8½	Anglo-Chinese.....	Honan.
Kaileng-Honan.....	Pien-Lu and Lung-Hai.	344	4	8½	Franco-Belgian....	Honan and Kiangsu.
Shanghai-Nanking.....	Hu-Ning.....	203	4	8½	Anglo-Chinese.....	Kiangsu.
Shanghai - Hangchow - Ningpo.	Hu-Hang-Yung...	178	4	8½	Anglo-Chinese.....	Kiangsu and Che-kiang.

¹ This map was inserted by the Bureau of Foreign and Domestic Commerce. Trade Commissioner Rhea notes an inaccuracy with respect to the Omur Railway. Blagovestchensk is not on the main line but is connected with it by a branch.

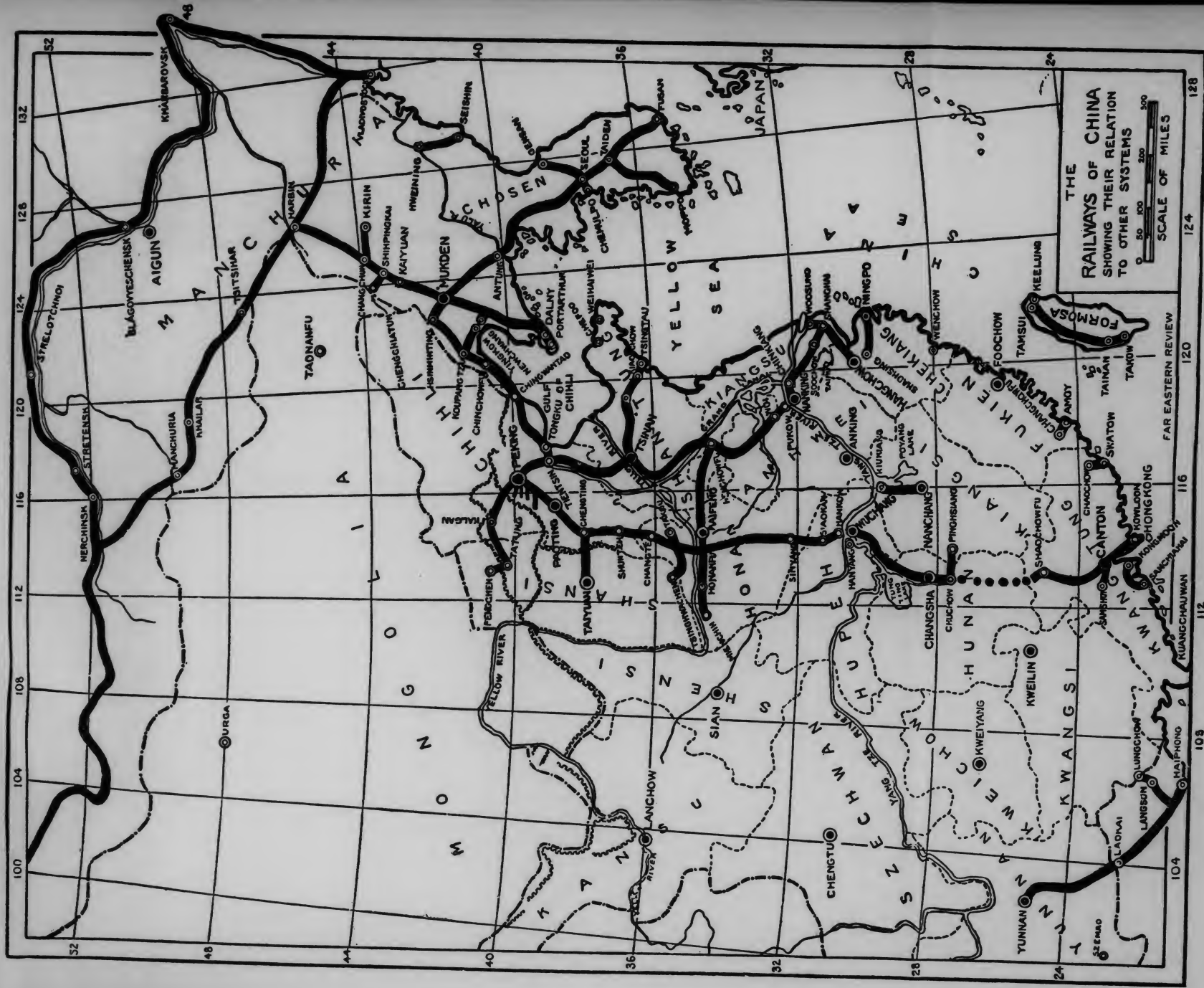


FIG. 2.—RAILWAY MAP OF CHINA.

GROUP NO. 1: CHINESE GOVERNMENT RAILWAYS—Continued.

English name of railway.	Chinese name of railway.	Miles of line.	Gauge.	Source of capital.	Provinces in which railway is located.
Canton-Hankow.....	Yueh-Han.....	269	<i>Ft. In.</i> 4 8½	Four Nations (Hu-kuang).	Hupei, Hunan, and Kiangsu.
Canton-Samshui.....	Kwang-Sam.....	30	4 8½	Chinese.....	Kwangtung.
Canton-Kowloon.....	Chui-Kuang.....	89	4 8½	Anglo-Chinese.....	Kwangtung.
Changchow-Amoy.....	Chang-Hsia.....	20	4 8½	Chinese.....	Fukien.
Subtotal.....		3,773			
Kirin-Changchun.....	Chi-Chang.....	80	4 8½	Sino-Japanese.....	Kirin (Manchuria).
Ssuningkai-Chengchiatun.....		52	4 8½	Japanese.....	Kirin (Manchuria).
Total Group 1.....		3,905			

GROUP NO. 2: CHINESE PRIVATE (STOCK-OWNED) RAILWAYS.

Sunning.....	Hsin-Ning.....	67	<i>Ft. In.</i> 4 8½	Chinese.....	Kwangtung.
Kwangtung-Yueh-Han Railway Co. (Ltd.)	Yueh-Han.....	140	4 8½	Chinese.....	Kwangtung.
Swatow-Chaochow.....	Chao-Shan.....	27	4 8½	Sino-Japanese.....	Kwangtung.
Total Group 2.....		234			

GROUP NO. 3: CHINESE PROVINCIAL RAILWAYS.

Kiangsi.....	Nan-Shan.....	87	<i>Ft. In.</i> 4 8½	Sino-Japanese.....	Kiangsu.
Tsitsihar.....	Chao-Shan.....	17	<i>Meter.</i>	Chinese.....	Heilungkiang (Manchuria).
Nanking City Railway.....		8	<i>Ft. In.</i> 4 8½	Chinese.....	Kiangsu.
Total Group 3.....		112			

GROUP NO. 4: CHINESE INDUSTRIAL RAILWAYS.

Tayeh.....		17	<i>Ft. In.</i> 2 0	Sino-Japanese.....	Hupei.
Kailan Mining Administration.		6	4 8½	Anglo-Chinese.....	Chihli.
Tai-Tsao.....	Tai-Tsao.....	27	4 8½	Chinese.....	Shantung.
Total Group 4.....		50			

GROUP NO. 5: "CONCESSIONED" (FOREIGN) RAILWAYS.

Chinese Eastern.....	Tung-Ching.....	1,078	<i>Ft. In.</i> 5 0	Russian.....	Kirin and Heilungkiang (all in Manchuria).
South Manchuria.....	Nanmant.....	692	4 8½	Japanese.....	Shengking and Kirin (all in Manchuria).
Shantung.....	Santo ¹ (Chiao-Chi).....	277	4 8½	Sino Japanese.....	Shantung.
Yunnan.....	Tien-Yueh.....	² 287	<i>Meter.</i>	French.....	Yunnan.
Canton-Kowloon.....	Chiu-Kuang.....	22	4 8½	British.....	Kwangtung.
Total Group 5.....		2,356			

¹ Japanese names.² Does not include the 248 miles of this line in French Indo-China.

SUMMARY.

Groups.	Total miles of line.	Miles of line of various gauges.			
		5 feet (Russian).	4 feet 8½ inches (standard).	3 feet 3.37 inches (meter).	2 feet.
Group No. 1: Chinese Government railways.....	3,905	.....	3,754	151	.....
Group No. 2: Chinese private railways.....	234	.....	234	.....	.....
Group No. 3: Chinese provincial railways.....	112	.....	95	17	.....
Group No. 4: Chinese industrial railways.....	50	.....	33	.....	17
Total Chinese railways, Groups Nos. 1, 2, 3, and 4.....	4,301	.....	4,116	168	17
Group No. 5: Foreign railways.....	2,356	1,078	901	287	.....
Total all railways in China.....	6,657	1,078	5,107	455	17

GAUGE.

This seems an opportune place to call attention to the small amount of railway of other than 4 feet 8½ inches gauge. The latter may well be termed the standard gauge of China, particularly as regards the Chinese Government Railways. Only 168 miles out of a total of 4,251 miles of commercial railways (foreign and industrial railways not included), or only about 4 per cent, is of other than the standard gauge; this 168 miles is all meter gauge, and most of it was built with the mistaken idea of building a cheap line. This fortunate result could hardly have been expected in view of the fact that the lines were built by engineers of many different nationalities and with different kinds of materials and equipment.

PROPOSED NEW LINES.

The writer's investigation did not contemplate an attempt to analyze the proposals for new lines, but it seems proper at this point to outline briefly the most important projects that are in course of construction or for which fairly definite agreements have been made. The most important of these are the Hukuang Railways (Four Nations Loan), the Pukow-Sinyang Railway (Chinese Central Railways, Ltd., British), the Shasi-Shingyifu Railway (Pauling & Co., Ltd., British), and the Siems-Carey (American) projects, as well as the extensions of the Pienlo Railway (French), the Tao-Ching Railway (Peking Syndicate, British), and the Peking-Suiyuan Railway (Chinese). The following sections outline the present status of the first four, and the last two will be referred to later in connection with the existing lines. There are a great many other projects, but most of them have had only paper consideration or reconnaissance at the most. To give any considerable number of these even passing mention would take a great amount of space and would be inadvisable for the reason that very few of these projects are likely to be carried out without first being considerably modified. The extensions of the Kirin-Changchun and the Ssuningkai-Chengchiatun lines will be mentioned in connection with Manchuria and the South Manchuria Railway (Japanese), by which they are actually controlled, although nominally Chinese Government Railways.

HUKUANG RAILWAYS.

These proposed railways consist of two trunk lines—one between Canton and Hankow and the other between Hankow and Chengtu, the capital of the Province of Szechwan.

The Canton-Hankow line and branches total about 685 miles, of which 269 miles on the Hankow end is now practically completed. On the south end 140 miles is completed and is now being operated by a private company, but on the completion of the rest of this trunk line it will be taken over by the Ministry of Communications. This leaves about 250 miles to be finished. This is considered by far the most important railway in China to be completed. It will connect the thickly populated part of South China with Peking and Hankow and the other parts of Central and North China. No doubt, as soon as conditions warrant, steps will be taken to secure further loans for the completion of the work. The writer was informed that location surveys have been practically completed for the remaining parts of the line, and this should enable more accurate estimates to be made on the cost than has been the rule with many of the other lines.

The Hankow-Szechwan line totals about 800 miles. No part of this line has been completed and very little effective construction work has yet been done, for the reason that the portion near Ichang partly completed by the provincial authorities before the taking over of this line by the Ministry of Communications has been abandoned to enable a line of better grade to be secured by the change of route.

Appendix 8 shows a copy of the final Hukuang Loan Agreement and several subsequent notes under date of March 1, 1913, March 3, 1913, and September 12, 1913. This agreement may be of particular interest in the event of negotiations for further funds, in view of the fact that the available British and American funds have been utilized for the building of 269 miles of the Canton-Hankow line now practically completed and in view of the controversy that arose regarding the awarding of some of the business in this connection.

PUKOW-SINYANG RAILWAY.

This proposed line is to connect with the Tientsin-Pukow line at Wui, a short distance north of Pukow, using the latter line's Pukow terminals, and is to extend west about 350 miles through the Provinces of Anhwei and Honan, connecting with the Peking-Hankow line at Sinyangchow, about 135 miles north of Hankow.

The preliminary agreement for this line was signed in 1899, but the final agreement was not actually executed by the Ministry of Communications until November, 1913. This agreement was signed by the Chinese Central Railway (Ltd.) as a purely British undertaking, providing for the appointment of British engineers and the use of British materials and equipment, but it is claimed that a considerable percentage of the stock of the company has passed into the hands of French and Belgians, who will thus be entitled to their share of the profits of this enterprise. The terms of this agreement are the same as the Tientsin-Pukow conditions referred to later as being more favorable from the Chinese standpoint than the railway loan agreements made previous to that time. The Tientsin-Pukow agreement is shown in Appendix 6.

The duration of the loan is 40 years and amortization was to have commenced with the eleventh year from the date of the loan, Janu-

ary 13, 1908, but on account of the delay occasioned by the war this will hardly apply. Very little progress has been made in connection with the actual construction of this line, but it is believed to be one of the projects that will be taken in hand as soon as funds can be secured after the war.

SHASI-SHINGYIFU RAILWAY.

This line is to connect Shasi on the Yangtze River in the Province of Hupeh, about 200 miles above Hankow, with Shingyifu in the Province of Kweichow, a distance of about 655 miles. A branch is to connect Changtehfu on this line with Changsha, about 105 miles distant, where it would connect with the Canton-Hankow Railway. This loan agreement was substituted, with little modification, for the Canton-Chingkung agreement made by the Chinese National Railway Corporation, of which Dr. Sun Yat Sen was director general and Mr. George Bronson Rea technical secretary. This loan agreement is with Pauling & Co. (Ltd.) (British), who are to carry out the construction on a basis of cost plus a percentage for their services and profit. The Government, after the dissolution of the Chinese National Railway Corporation, refused to recognize the validity of any agreement entered into by Dr. Sun, but realizing the advantage of this form of agreement, it proceeded to negotiate another contract with the same firm for the construction of what is considered the more important line from Shasi to Shingyifu. This last agreement was signed by the Ministry of Communications in July, 1914. The loan is to run 40 years. There are many points in this arrangement that are considered to be of relatively great advantage to the Chinese Government as compared with any previous form of railway loan agreement. It is probable that the Ministry of Communications will contend, so far as practicable, for these general terms in all future agreements. A copy of this agreement is shown in Appendix No. 7.

SIEMS-CAREY PROJECTS.

The Siems-Carey Co. is an American corporation that has entered the field in China in recent years and that has a preliminary agreement for financing and constructing several hundred miles of railways for the Ministry of Communications. There are a number of lines for which surveys and field studies of the routes are being made, and from these data estimates and conclusions are being arrived at regarding the cost and advisability of building the several lines under consideration. Under the circumstances, their construction is certainly very desirable, but a most serious difficulty has been encountered in the objections raised by persons who assert that the rights of their concessions are being invaded.

RAILWAY AGREEMENTS.

Railway agreements in China can be divided into two distinct classes—first, railway concessions, which are really not agreements in a strict sense, and second, the class that can fairly be called railway loan agreements. It is well to understand that a railway loan in China is not the usual commercial transaction that it is in most other parts of the world, particularly in the United States or Canada,

but is in fact a political issue between two or more nations, of which China is one of the principals.

As stated previously, it was thought that it would not be necessary to cover the subject of railway agreements in preparing this monograph on railway markets in China, but a brief study led to the conclusion that this would be a necessary or at least a very desirable feature of the report, to support some of the conclusions and suggestions made later. The railway agreements of China have been discussed and written about to a considerable extent, but this appears to have been done in most cases from either the political or the financial viewpoint, as is very natural, since they were framed so largely from those standpoints. The writer's study, however, was made from the viewpoint of the engineer confronted with the construction, maintenance, and operation of these lines and the purchase of materials, equipment, and supplies to the best advantage. In this connection one of the features especially considered was the development of traffic between the several railways and the grouping and consolidating of the management of the various lines in the most economical arrangement. This should be permissible, since the central Government is in most cases actually responsible, as the last source, for the interest on the loans; but in reality the restrictions of the loan agreements prevent the consolidation of the railways to the best advantage of the whole.

To illustrate the various features of both classes of arrangements and the progressive development of the situation from the forcing on China by Russia of the Chinese Eastern Railway concession to the conclusion of the Pauling Loan agreement, granting to China reasonable conditions for the financing and construction of the railways and the right to operate them as Chinese properties after construction, the writer has, in general, shown only such agreements as appear to be typical and to mark actual steps in the development of this situation. However, copies have been added of the Hukuang Loan agreement and notes of interpretation, for the reason that the Hukuang and the Siems-Carey agreements are the only ones in which American interests are involved at present. There is also a copy of the Ssupingkai-Chengchiatun Railway agreement, as representing the latest type of Sino-Japanese agreement in connection with the lines being built in Manchuria with Japanese loans, which will, for the present, at least, be operated as part of the South Manchuria Railway system.

No effort has been made to show all the numerous agreements—not even all of those relating directly to the most important lines—but to any one interested in this situation it is suggested that the most complete information available can be found in the publication that was expected to appear some time in 1918 under the title "Compilation of treaties and agreements with and concerning China concluded during the period from 1894 to 1917, inclusive," under the editorship of Mr. J. V. A. MacMurray, first secretary of the American legation in Peking. This will be published under the auspices of the Carnegie Endowment for International Peace.

CHINESE EASTERN RAILWAY AGREEMENT.

Appendix 2 contains translations of documents relating to the first concession (and one of the most important) forced from China

during the "Battle for Concessions." The first document (see p. 274) is the agreement for the construction and operation of the Chinese Eastern Railway from Pogranichnaya (Suifenho, Chinese name) on the eastern border to Manchuria (Manchouli) on the western border of Manchuria, now forming part of the Trans-Siberian route. The original of this agreement is in Chinese and French. The translation in the Appendix is from the French text and is the same as will appear in Mr. MacMurray's compilation. The text shown by Mr. Kent in his "Railway Enterprise in China" is a translation from the Chinese, taken from Rockhill's "Treaties and conventions entered into by China between 1894 and 1904." While these translations differ in some details the substance is practically the same, but it is probable that the French text is the one that guided the Russians in their handling of this situation. The second document in Appendix 2 (see p. 276) is a translation of the supplemental agreement for the construction and operation of the South Manchurian Branch (then so-called) from Harbin to Port Arthur. This is the translation from the Chinese text as shown by Rockhill's "Treaties." The name of the Russo-Chinese Bank has since been changed to the Russo-Asiatic Bank.

The concluding section of Appendix 2 (see p. 278) shows the "Statutes of the Chinese Eastern Railway Co.," which are given in order to show the scope of the powers granted to the railway company to develop and operate the resources of this territory in addition to the construction and operation of a railway. This text is taken from Kent's "Railway Enterprise in China." The writer was unable to identify the text from which this translation was made, but in view of the accuracy of all of Mr. Kent's data, no doubt is entertained with respect to its correctness.

Reference to the taking over of the southern part of the South Manchurian Branch (or what is now the South Manchuria Railway Co.'s line) from Russia by Japan as a result of the Russo-Japanese War and the extending of this concession to a total of 99 years will be made later in connection with the South Manchuria Railway Co.

PEKING-HANKOW RAILWAY AGREEMENT.

In this case it may be considered that the arrangement was first a concession and at a later date was changed to a loan agreement. The first section of Appendix 3 (see p. 285) is the translation from the French text, as shown by Rockhill's "Treaties." The second section has to do with a supplementary loan. This is a translation from the French text as printed in Mr. C. C. Wang's "Railway Loan Agreements."

The history of these negotiations is long and complicated but the outstanding points are as follows: The project was first undertaken by Grand Councilor Chang and Mr. Sheng, both previously mentioned, who endeavored to raise two-thirds of the necessary capital among the Chinese. When this failed and when negotiations were in progress with the Carey-Washburn group of American interests, the Belgians appeared and their terms seemed so attractive that Director General Sheng proceeded to close on what, at that time, he regarded as the best terms. When the details came to be settled, however, many of the apparently good terms had to be modified. It is probable that this is one of the loans in which there will be

considerable difficulty in finally overcoming all the restrictions, though a good deal of progress has already been made to that end.

PEKING-NEWCHWANG RAILWAY AGREEMENT.

This was the first real loan agreement of any magnitude negotiated. It is of the class in which the Chinese gave all the actual management into the hands of foreigners. The first section of Appendix 4 (see p. 294) is a copy of the preliminary agreement of June 7, 1898, and the second section is the final agreement of October 10, 1898—both taken from Kent's "Railway Enterprise in China." This agreement was very vigorously objected to by Russia as encroaching on its "sphere of influence" in Southern Manchuria and constituting what the Russians called "foreign control of the line."

It was on this occasion that England and Russia reached the agreement that the latter should confine its activities to Manchuria and territory north of the Great Wall and England to the Yangtze Valley, as outlined in the notes between Count Muravieff and Sir Charles Scott. Without question this agreement and the success of the Peking-Mukden Railway gave the British an opportunity, which they utilized to considerable advantage, to introduce British railway methods and equipment on this and other Chinese railways. The Peking-Mukden Railway loan has been shown to have the best margin of safety of any loan so far.

CANTON-KOWLOON RAILWAY AGREEMENT.

The next step in the change of conditions for railway loans was marked by the agreement for the Chinese portion of the Canton-Kowloon Railway, which was signed March 7, 1907. Appendix 5 (see p. 299) shows a copy of this agreement, as given in Rockhill's "Treaties." In the discussion of railway loan agreements in China in recent years the terms of this agreement have been referred to as typical of the conditions claimed by British interests to constitute the best arrangement for the construction of railways in China with money raised on foreign loans. This agreement provides that the administration and control of the funds shall be under a Chinese managing director appointed by the viceroy and that there shall be associated with the managing director a British chief engineer and a British chief accountant nominated by the British & Chinese Corporation and approved by the viceroy. A great deal has been said about the effects of this arrangement, but it has worked out to what might be called a dual control, with the British chief engineer and British chief accountant in technical control of the administration.

TIENTSIN-PUKOW RAILWAY AGREEMENT.

The next advance in the development of the loan conditions was the signing of the Tientsin-Pukow agreement January 13, 1908. The conditions have since become known as the "Tientsin-Pukow Terms" and mark a distinct type of loan agreement. Appendix 6 (see p. 306) is the text as shown by Rockhill's "Treaties." The terms of this loan were more to China's liking than the conditions of any loan made up to that time. It put in the hands of the Chinese director general control of funds derived from the loan. The British

and German chief engineers are subordinate to the managing director on their respective sections. There is no provision for the appointment of foreign accountants, but the agreement does properly give the loan syndicate the right to examine the accounts. It permits the purchase of materials and equipment on a better basis for China, which succeeded in obtaining these more favorable conditions by taking advantage of the competition for the securing of the loan. One particular feature of this loan is that the railway itself is not mortgaged as collateral security. Another important point is that, in case of default, the collection of the mortgaged revenue is to be administered by the Chinese Maritime Customs.

PAULING & CO. AGREEMENT.

The last step in the improvement of Chinese railway loan terms was achieved by the signing of the Shasi-Shingyifu agreement, which has become generally known as the Pauling type of agreement. The first section of Appendix 7 (see p. 312) is a copy of the final agreement, and the second section is a copy of a supplemental agreement.

This type of agreement is considered as extending to China the most favorable terms of any that has yet been signed. Some of the important features are as follows: The work is to be constructed at cost plus a percentage for the services and profit of the contracting firm. The decision as to the location of the line, the preparation of plans and specifications, and the supervision of the work of construction are to be under a Chinese managing director appointed by the Chinese Government, who during the period of construction is to be a "Chinese engineer of standing." The latter is to cooperate with a firm of foreign consulting engineers whose representative in China is to be a British engineer, who during the construction period is to be called engineer-in-chief of construction. A firm of foreign accountants is to keep the accounts of the loan, subject to inspection by accountants representing the Chinese managing director. Specifications and estimates of cost must be approved by the Chinese authorities before the work of construction is proceeded with. The managing director calls for and accepts tenders subject to the approval of the engineer-in-chief of construction. The agreement provides for the use of Chinese standards for roadway, track, bridges, and equipment, when such standards may be adopted by the Chinese Government Railways, and also provides for the use of the unified system of Chinese Railway accounts.

The loans are secured on the railway and properties in connection therewith and are also to be guaranteed by the Chinese Government. After completion the property is to continue under the direction of a Chinese managing director and the engineer-in-chief shall be a British subject.

The agreements so far entered into by the Siems-Carey Railway & Canal Co. (American) conform, in general, to the above type of agreement.

The types of agreements already mentioned are intended to show the general classification and the step-by-step development of this situation in China. In addition, the Hukuang agreement will now be referred to on account of the probability of further loans being undertaken in this connection, particularly for the completion of the

Canton-Hankow Railway. The Ssupingkai-Chengchiatun agreement will also be referred to as illustrating the latest type of Japanese agreement for the building of additional lines in Manchuria. It would have been preferable to show a copy of the last Kirin-Changchun Railway loan agreement, but the writer was unable to obtain a translation of this agreement that he considered sufficiently reliable to print.

HUKUANG RAILWAYS LOAN.

Appendix 8 (see p. 322) contains a copy of the original English text of the Hukuang Railways loan agreement, as well as copies of the several memoranda regarding specifications and the purchase of materials and equipment, which has occasioned considerable controversy between the British and American interests, particularly as to whether British or American practice should prevail for the locomotives purchased. In addition to the revenues pledged for the protection of this loan, it has been agreed that the property and materials of the railways shall be specially given as a provisional guaranty that the *likin* will be maintained unimpaired.

The agreement divides the construction of these railways as follows: To the British the Yichanghsien section or the Hankow end of the Canton-Hankow Railway, which is much the most important section; to the Germans the Kwangshui-Ichang section, or the Hankow end of the Szechwan-Hankow Railway; to the Americans the Ichang-Kweichowfu section of the Szechwan-Hankow line; to the French the section of the latter railway from Kweichowfu to Chengtu. By agreement all the available British and American funds have been used in completing the construction of the Yichanghsien section of the Canton-Hankow Railway to Changsha.

SSUPINGKAI-CHENGCHIATUN RAILWAY AGREEMENT.

Appendix 9 is a translation of the Ssupingkai-Chengchiatun agreement, taken from the *Far Eastern Review* for May, 1917. This is a translation from the Chinese text. It is stated on good authority to be an excellent translation.

It is felt that a short study of the agreements mentioned will afford convincing proof of the need of action (such as is later suggested) to remove the restrictions that impede the progress of China in general and its railways in particular.

IV. CHINESE GOVERNMENT RAILWAYS.

INTRODUCTION.

The table beginning on page 42 shows the existing railways that constitute the system known as the Chinese Government Railways, with a total of 3,900 miles of line. All these railways are under the control of the Ministry of Communications except the last two, which are only nominally so; the actual control of these two branch lines is now to a great extent in the hands of the Japanese, and they practically come under the administration of the South Manchuria Railway Co., which will be referred to later in connection with the Japanese activities in Manchuria.

From the standpoint of markets for American railway materials and equipment, the Chinese Government Railways and the new lines, extensions, and additions that will be built in the future under the direction of the Ministry of Communications constitute a more important field than any other in the Far East, and accordingly they will be discussed at greater length than any of the other railways covered by this report. Upon reference to the railway map facing page 42, it will be noticed that the lines included in the first subtotal (in the table on p. 53) radiate from Peking and Tientsin, connection being made at Nanking by ferry across the Yangtze River. It is further apparent that, by the use of a ferry, the Canton-Hankow line can be connected with the other parts of the system. There is one small line about 20 miles long—the Changchow-Amoy Railway—that has no connection with this system of railways; the writer was unable to obtain reliable data regarding this line.

The investment assets, construction costs, operating results, interest charges, and surplus earnings of these railways will first be considered; then the status of the Ministry of Communications as regards its direction of the financing, construction, maintenance, and operation of these railways will be taken up; and, finally, a brief account will be given of the special features of each line. These points, taken together, will form the basis of the suggestions and recommendations beginning on page 243 of this report.

At this point it seems proper to state that, notwithstanding the restrictions of the railway loan agreements, the Chinese Government, through the medium of the Ministry of Communications, has made steady and rather surprising progress in securing control and unifying the operation of these railways. This has particularly been the case since the middle of the year 1911, and the conclusion seems warranted that this control will be gradually extended as the railway loans are amortized in the course of time. This situation should be given thorough study by American manufacturers of railway materials and equipment in their efforts to secure the large amount of business that will be awarded in the building of the new lines and the extensions and additions to the existing lines.

INVESTMENT ASSETS.

The first of the following tables shows the total investment assets of the Chinese Government Railways, with the exception of the two branch lines (already mentioned) in Manchuria and the Changchow-Amoy line in Fukien. The investment assets, according to the Chinese classification on the general balance sheet, include cost of road and equipment, cost of other physical property, and cost of nonphysical assets.

INVESTMENT ASSETS AND INTEREST CHARGES OF THE CHINESE GOVERNMENT RAILWAYS.

Name of railway.	Date of data.	Total investment assets.	Miles of line.	Investment assets per mile of line.	For year 1916—		
					Interest on funded debt.	Surplus of net income.	Deficit of net income.
		<i>Mex. dollars.</i>		<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden.....	1916	60,467,577	600	100,779	773,033	8,134,449	.....
Peking-Suiyuan.....	1915	25,649,763	267	96,067	.....	1,380,448	.....
Tientsin-Pukow.....	1916	99,803,208	678	147,202	4,770,267	385,369	.....
Peking-Hankow.....	1916	100,298,991	814	123,217	2,320,917	10,770,381	.....
Cheng-Tai.....	1915	21,559,212	151	156,021	653,741	174,396	.....
Taokow-Chinghua.....	1915	7024,141	95	76,614	380,000	.....	.....
Kaifeng-Honan.....	1915	13,358,784	115	116,137	697,494	22,933	.....
Shanghai-Nanking.....	1916	30,484,417	203	150,170	1,318,535	491,444	.....
Shanghai-Hangchow-Ningpo.....	1916	21,307,376	178	119,704	643,369	.....	261,076
Subtotal.....		382,207,499	3,101	123,253	11,557,149	21,409,440	261,076
Chuchow-Pinghsiang.....	1915	4,743,045	60	79,051	.....	51,775	.....
Canton-Kowloon.....	1915	16,708,406	89	187,735	701,747	.....	787,009
Canton-Samsui.....	1915	3,262,491	30	108,750	.....	388,138	.....
Total.....		406,741,411	3,280	124,007	12,258,896	21,849,353	1,048,085
						20,801,268	

SUMMARY OF BALANCE SHEETS.

Items.	Peking-Mukden.	Peking-Suiyuan.	Tientsin-Pukow.	Peking-Hankow.	Shanghai-Nanking.	Shanghai-Hangchow-Ningpo.	Total.
ASSETS OR DEBIT BALANCES.							
Investment assets:	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Cost of road and equipment.....	59,942,844	25,557,601	99,803,208	97,807,196	30,484,417	21,307,376	334,902,642
Cost of other assets.....	524,733	92,162	.....	2,491,795	.....	.....	3,108,690
Total.....	60,467,577	25,649,763	99,803,208	100,298,991	30,484,417	21,307,376	338,011,332
Working assets:							
Cash.....	3,930,186	76,256	2,357,966	3,953,061	911,481	1,565,937	12,794,907
Stores.....	4,431,576	1,268,825	1,830,534	4,437,467	640,444	493,756	13,102,602
Other working assets.....	1,500,690	1,163,351	656,096	720,560	49,752	82,895	4,173,544
Total.....	9,662,392	2,508,432	5,044,536	9,111,428	1,601,677	2,142,588	30,071,053
Deferred debit items:							
Temporary advances to Government.....	1,558,251	.....	.....	.....	168,172	.....	1,746,423
Other deferred debits.....	2,149,096	1,437,079	1,147,854	10,112,914	1,976,628	1,958,914	18,782,517
Total.....	3,707,349	1,437,079	1,147,854	10,112,914	2,164,800	1,958,914	20,528,940
Accumulated deficit.....	.....	.....	5,793,878	.....	7,135,611	1,031,339	13,960,828
Grand total.....	73,837,318	29,595,274	111,789,506	119,523,333	41,386,505	26,440,217	402,572,153

SUMMARY OF BALANCE SHEETS—Continued.

Items.	Peking-Mukden.	Peking-Suiyuan.	Tientsin-Pukow.	Peking-Hankow.	Shanghai-Nanking.	Shanghai-Hangchow-Ningpo.	Total.
LIABILITIES OR CREDIT BALANCES.							
Capital liabilities:	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Permanent Government investments.	23,903,393	23,562,237	3,589,350	40,369,381	3,672,671	4,989,707	100,086,739
Other capital liabilities.	19,576,616		95,249,974	58,450,583	29,955,514	18,405,015	221,637,702
Total.	43,480,009	23,562,237	98,839,324	98,819,964	33,628,185	23,394,722	321,724,441
Working liabilities:							
Loans.	549,734		1,328,031	1,400,000	188,172		3,465,937
Other liabilities.	433,220	1,675,481	603,920	1,512,650	259,647	105,031	4,589,849
Total.	982,954	1,675,481	1,931,951	2,912,650	447,819	105,031	8,055,786
Deferred credit items:							
Temporary advances from Government.	1,691,415		8,645,607		5,519,087	2,006,728	17,862,927
Other deferred credits.	6,731,613	921,324	2,372,634	8,283,261	1,427,491	933,736	20,670,059
Total.	8,423,028	921,324	11,018,331	8,283,261	6,946,578	2,940,464	38,532,986
Accumulated surplus:							
Additions to property through surplus.	11,166,657	1,998,455		7,239,678			20,404,790
Funded debt retired through surplus.	9,784,670				363,923		10,148,593
Free surplus.		1,437,777		2,267,780			3,705,557
Total.	20,951,327	3,436,232		9,507,458	363,923		34,258,940
Grand total.	73,837,318	29,998,274	111,789,506	119,523,333	41,386,505	26,440,217	402,572,153

AVERAGE CONSTRUCTION COST PER MILE OF LINE, DISTRIBUTED TO ACCOUNTS, OF SIX TYPICAL CHINESE GOVERNMENT RAILWAYS.

Items.	Peking-Mukden.	Peking-Kalgan.	Tientsin-Pukow.	Peking-Hankow.	Shanghai-Nanking.	Shanghai-Hangchow-Ningpo.	All Chinese Government Railways.
							Average cost per mile. Per cent.
I. CONSTRUCTION ACCOUNTS.	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
General expenditures.	10,009	7,897	15,655	13,872	11,760	3,359	12,080
Preliminary expenditures.	506	584	1,094	62	323	54	488
Land.	2,283	3,804	5,520	4,163	14,690	3,130	4,906
Formation (grading).	3,774	7,619	8,773	7,164	10,254	1,266	7,219
Tunnels.		3,899		293	1,847		498
Bridge work.	16,808	6,344	31,310	17,356	13,521	6,664	18,219
Line protection.	296	57	330	85	331	8	199
Telegraph and telephones.	374	734	1,130	445	515	142	556
Track.	21,454	17,535	29,182	22,924	35,300	6,745	22,932
Signals and switches.	1,457	893	926	929	445	130	887
Stations and other buildings.	7,573	7,381	9,397	6,867	12,508	1,529	7,190
Central mechanical works.	3,752	1,267	1,789	330	2,792		1,585
Special mechanical works.			112	205	632		115
Plant.	1,147	159	466	1,207	1,656	374	982
Rollingstock.	20,186	27,505	15,150	20,854	23,988	5,018	18,562
Maintenance.	263	1,801	3,749	2,323			1,597
Docks and wharves.	216		978		2,877		438
Floating equipment.	219		229		205		122
Total part I.	96,406	87,189	125,790	99,079	133,656	28,419	98,575

AVERAGE CONSTRUCTION COST PER MILE OF LINE, DISTRIBUTED TO ACCOUNTS, OF SIX TYPICAL CHINESE GOVERNMENT RAILWAYS—Continued.

Items.	Peking-Mukden.	Peking-Kalgan.	Tientsin-Pukow.	Peking-Hankow.	Shanghai-Nanking.	Shanghai-Hangchow-Ningpo.	All Chinese Government Railways.
							Average cost per mile. Per cent.
II. FINANCIAL ACCOUNTS.	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Interest during construction.			20,161	15,076	15,451	12,184	10,253
Exchange.		14	7		909	1,319	177
Unclassified.			3,174	18,303	3,227	29,633	7,196
Total part II.		14	23,342	33,381	19,587	16,130	17,272
Total parts I and II.	96,406	87,203	149,132	132,460	153,243	44,549	115,847
Deduct receipts on capital account.			11,082	9,101	3,163		5,380
Total cost of road and equipment.	96,406	87,203	138,050	123,359	150,080	44,549	110,467

It will be noted that the information with regard to investment assets is shown for different years. That for the year 1916 has been taken from the annual reports of the several lines. For the Peking-Suiyuan line the figures have been taken from the 1915 annual report. The data for the other lines have been taken from the Ministry of Communications consolidated report for the year 1915. This latter information has been, to a considerable extent, approximated.

The second of the preceding tables is an analysis of the general balance sheets of the railways for which the writer was able to obtain annual reports. These are all for the year ended December 31, 1916, except the Peking-Suiyuan, which is for the year 1915. It is interesting to note that, when consideration is given to the accumulated surplus, the Chinese Government actually owns approximately one-third of the actual equity in the investment assets of these railways and that this equity is steadily growing from year to year.

CONSTRUCTION COSTS.

The figures shown above as investment assets really represent the aggregate capital cost of the property, but the last of the above tables shows the average construction cost per mile of line (distributed to accounts) of lines that have been selected as typical, so as to enable comparisons to be made. These figures were furnished by Mr. George A. Kyle, chief engineer of the Siems-Carey projects, and were prepared for his guidance in making estimates of costs of the rail ways that this concern contemplates building for the Ministry of Communications.

Of the lines selected, the Peking-Mukden is the oldest, was built in sections, has always been a very profitable line, and runs through country that was easy, or only moderately rough, for railway building, with only two bridges of any considerable size. The Peking-Kalgan section, the first 125 miles of the present Peking-Suiyuan Railway, was built entirely by Chinese engineers. The point, about 25 miles over the West Hills, where the line passes under the Great Wall,

is in a rough, broken mountain country, and a $3\frac{1}{2}$ per cent grade has been used for the east slope. The Tientsin-Pukow is the British-German-built line, running through a somewhat more difficult country than the Peking-Mukden and with more expensive bridge construction. The Peking-Hankow is the Franco-Belgian-built line, and probably represents a very fair average of all the railways in China; it is rather interesting that in all respects the figures for this line are near the average for all the lines. The bridge on this line crossing the Yellow River is the longest bridge that has been built on any of the lines. The fifth line selected, the Shanghai-Nanking, runs through a densely settled country; the high cost of this line has been much criticized by the Chinese, but it is very substantially built, with rock-ballasted track and somewhat ornate stations. The sixth and last line selected is the Shanghai-Hangchow-Ningpo, which was largely built by Chinese engineers; it was finally taken over and is now operated in connection with the Shanghai-Nanking. This line also runs through a densely populated country, and the conditions are quite comparable to those on the Shanghai-Nanking. This line was built at a lower cost per mile than any other line, but it is not so substantially built as the Shanghai-Nanking and the stations are more simple in design.

It is not the purpose of this report to discuss the merits of the difference-in-cost controversy, but it is regarded as pertinent to refer at this point to photographs of some of the stations, as illustrating the different features of construction. Figure 3, facing this page shows the station at Tsinanfu on the German section of the Tientsin-Pukow line. Figure 4 shows the Shantung Railway station, about 1,000 feet from the first station on an air line but more than half a mile by road. Both, as shown by the illustrations, are very substantial and ornate buildings. Figure 5 shows the Peking-Mukden station at Tientsin, handling satisfactorily one of the largest volumes of passenger travel in China. Figure 6 shows the Chinese post office at Tientsin, a substantial and well-built structure, but not so ornate as the stations at Tsinanfu. Figure 7, facing page 64, shows a way station that is typical of those on the German section of the Tientsin-Pukow line and on the Shantung Railway, while figure 8 shows one of the neat and well-arranged way stations on the Peking-Kalgan line. Figure 9 shows the crossover bridge between "loops" at Tsinanfu, and figure 10 shows the crossover bridge at Tongshan, an equally important station on the Peking-Mukden Railway.

One item of construction expense in China that has caused much comment in the past has been the removal of graves. Figure 11 shows one of these graveyards, which, it will be noted, is located in the middle of a cultivated area. This is a typical illustration, and these small graveyards occur all over China, literally by the thousands. It is probable that the growing sentiment in favor of railways and the Government regulations for building new lines will greatly simplify this trouble in the future.

OPERATING REVENUES.

The following table shows the operating results for the same group of railways included in the first table on page 53. This covers operat-

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FIG. 3.—TSINANFU STATION ON THE GERMAN SECTION OF THE TIENSIN-PUKOW RAILWAY.



FIG. 4.—TSINANFU STATION ON THE SHANTUNG RAILWAY.

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FIG. 4.—TSINANFU STATION ON THE SHANTUNG RAILWAY.



FIG. 5.—TIENTSIN STATION OF THE PEKING-MUKDEN RAILWAY.



FIG. 6.—CHINESE POST OFFICE AT TIENTSIN.

CHINA.

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ing expenses and net results for operating only and is not intended to include any other figures:

OPERATING RESULTS OF CHINESE GOVERNMENT RAILWAYS FOR YEARS ENDED
DEC. 31, 1915 AND 1916.

Name of railway.	Operating revenues.		Operating expenses.		Operating ratio.		Net operating revenue.	
	1915	1916	1915	1916	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>			<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden...	15,277,931	14,809,724	7,579,599	5,953,576	49.6	40.3	7,698,332	8,856,148
Peking-Suiyuan...	3,613,394	3,895,780	1,956,504	2,317,139	(a)	59.5	1,656,890	1,578,641
Tientsin-Pukow...	8,525,038	10,188,976	5,307,034	5,121,879	60.9	50.4	3,218,004	5,067,097
Peking-Hankow...	17,141,100	20,466,622	7,120,230	7,027,542	42.0	34.3	10,020,860	13,439,080
Cheng-Tai...	2,111,500	2,184,027	1,319,500	1,290,367	63.0	59.0	792,000	893,660
Taokow-Chinghua.	633,400	834,945	379,800	380,717	60.0	45.5	253,600	454,228
Kaifeng-Honan (Pienlo).....	1,156,200	1,286,794	531,700	568,290	46.0	44.0	624,500	718,504
Shanghai-Nanking.	3,418,058	3,818,270	2,023,654	1,904,016	59.2	49.9	1,394,404	1,914,254
Shanghai-Hangchow-Ningpo....	1,914,242	1,798,504	1,468,402	1,444,826	76.7	80.3	445,840	353,678
Subtotal.....	53,790,863	59,283,642	27,686,393	26,008,352	51.3	44.1	26,104,470	33,275,290
Chuchow-Pinghsiang.....	(b)	744,566	(b)	690,123	(b)	92.7	(b)	54,443
Canton-Kowloon.....	805,800	794,223	804,500	829,663	99.0	104.5	1,300	-35,440
Canton-Samsul.....	850,600	962,091	480,000	487,435	56.0	50.7	370,600	474,656
Total.....	55,447,263	61,784,522	28,570,893	28,015,573	52.3	45.3	26,476,370	33,768,949
		55,447,263	28,015,573					26,476,370
		+6,337,259	-955,320					+7,292,579

a A part of the Kalgan-Suiyuan section was under construction during the year 1915.

b Figures for 1915 not available.

Name of railway.	Total gross income.		Total operating expenses.		Total net income.	
	1915	1916	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden.....	15,425,999	15,194,515	7,579,599	5,953,576	7,846,400	9,240,939
Tientsin-Pukow.....	8,556,946	10,315,314	5,307,034	5,121,879	3,249,912	5,193,435
Peking-Hankow.....	17,237,012	20,553,456	7,120,173	7,027,542	10,116,839	13,525,914
Shanghai-Nanking.....	3,442,596	3,837,845	2,023,654	1,904,016	1,418,942	1,933,829
Shanghai-Hangchow-Ningpo....	2,072,400	1,875,488	1,468,402	1,444,826	603,998	430,660
Total.....	46,734,353	51,776,616	23,498,832	21,451,839	23,235,491	30,324,777

Name of railway.	Total fixed charges and taxes.		Surplus or deficit.	
	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden.....	2,437,962	3,351,690	5,408,438	5,889,249
Tientsin-Pukow.....	5,976,695	4,987,533	-2,727,383	205,902
Peking-Hankow.....	4,047,267	4,774,001	6,069,572	8,751,913
Shanghai-Nanking.....	1,906,154	1,442,386	-487,212	491,443
Shanghai-Hangchow-Ningpo....	808,464	691,736	-365,466	-261,076
Total.....	15,277,542	15,247,346	7,957,949	15,077,431

INTEREST CHARGES AND TAXES.

The last three columns of the first table on page 53 show interest on funded debt and surplus or deficit of net income. These figures

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FIG. 5.—TIENTSIN STATION OF THE PEKING-MUKDEN RAILWAY.



FIG. 6.—CHINESE POST OFFICE AT TIENTSIN.

CHINA.

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ing expenses and net results for operating only and is not intended to include any other figures:

OPERATING RESULTS OF CHINESE GOVERNMENT RAILWAYS FOR YEARS ENDED DEC. 31, 1915 AND 1916.

Name of railway.	Operating revenues.		Operating expenses.		Operating ratio.		Net operating revenue.	
	1915	1916	1915	1916	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>			<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden...	15,277,931	14,899,724	7,579,599	5,953,576	49.6	40.3	7,698,332	8,946,148
Peking-Suiyuan...	3,613,394	3,895,789	1,956,594	2,317,139	(a)	59.5	1,656,800	1,578,641
Tientsin-Pukow...	8,525,038	10,188,976	5,307,034	5,121,879	60.9	50.4	3,218,004	5,067,097
Peking-Hankow...	17,141,100	20,466,622	7,120,200	7,027,542	42.0	34.3	10,020,900	13,439,080
Cheng-Tai...	2,111,500	2,184,027	1,319,500	1,290,367	63.0	59.0	792,000	893,660
Taokow-Chinghua...	633,400	834,945	379,800	380,717	60.0	45.5	253,600	454,228
Kaifeng-Honan (Pichilo)...	1,156,200	1,286,794	531,700	568,290	46.0	44.0	624,500	718,504
Shanghai-Nanking...	3,418,058	3,818,270	2,023,654	1,904,016	59.2	49.9	1,394,404	1,914,254
Shanghai-Hangchow-Ningpo...	1,914,242	1,798,504	1,468,402	1,444,826	76.7	80.3	445,840	353,678
Subtotal...	53,790,863	59,283,642	27,686,393	26,008,352	51.3	44.1	26,104,470	33,275,290
Chuchow-Pingsiang...	(b)	744,566	(b)	690,123	(b)	92.7	(b)	54,443
Canton-Kowloon...	895,800	794,223	804,500	829,663	99.0	104.5	1,300	-35,440
Canton-Samshul...	850,600	962,091	480,000	487,435	56.0	50.7	370,600	474,656
Total...	55,447,263	61,784,522	28,670,893	28,015,573	52.3	45.3	26,476,370	33,768,949
		55,447,263	28,015,573					26,476,370
		+6,337,259	-955,320					+7,292,579

a A part of the Kalgan-Suiyuan section was under construction during the year 1915.

b Figures for 1915 not available.

Name of railway.	Total gross income.		Total operating expenses.		Total net income.	
	1915	1916	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden...	15,425,999	15,194,515	7,579,599	5,953,576	7,846,400	9,240,939
Tientsin-Pukow...	8,556,346	10,315,314	5,307,034	5,121,879	3,249,312	5,193,435
Peking-Hankow...	17,237,012	20,553,456	7,120,173	7,027,542	10,116,839	13,525,914
Shanghai-Nanking...	3,442,596	3,837,845	2,023,654	1,904,016	1,418,942	1,933,829
Shanghai-Hangchow-Ningpo...	2,072,400	1,875,488	1,468,402	1,444,826	603,998	430,660
Total...	46,734,353	51,776,616	23,498,832	21,451,839	23,235,491	39,324,777

Name of railway.	Total fixed charges and taxes.		Surplus or deficit.	
	1915	1916	1915	1916
	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>	<i>Mex. dollars.</i>
Peking-Mukden...	2,437,962	3,351,690	5,408,438	5,880,249
Tientsin-Pukow...	5,976,695	4,987,533	-2,727,383	205,902
Peking-Hankow...	4,047,267	4,774,001	6,069,572	8,751,913
Shanghai-Nanking...	1,906,154	1,442,386	-487,212	491,443
Shanghai-Hangchow-Ningpo...	909,464	691,735	-305,466	-261,076
Total...	15,277,542	15,247,345	7,957,949	15,077,431

INTEREST CHARGES AND TAXES.

The last three columns of the first table on page 53 show interest on funded debt and surplus or deficit of net income. These figures

show only the interest on funded debt and do not include any allowance on the permanent investments of the Chinese Government. This information is given to show the margin of safety that the Chinese Government has in meeting the fixed expenses on this group of railways. It should be realized, of course, that as loans are amortized this margin of safety will be increased from year to year.

SURPLUS OR DEFICIT.

The Chinese Government has a good margin of surplus at the present time for meeting the interest charges on the funded debt, and this will increase from year to year. This, of course, does not include the funded debt on the Hukuang Railways, which for the present makes a considerable reduction; when these lines are completed, however, it will doubtless not be long before they will be meeting all their own interest charges and probably producing a surplus. It is felt by the writer that the financial status of the Chinese Government Railways is really much better than has been generally supposed. There is one point in this connection that probably deserves explanation—that is, the equity of the property added from surplus earnings; but the action of the Peking-Mukden bondholders in agreeing to the construction of the Peking-Suiyuan road from surplus earnings of the Peking-Mukden line would seem to have disposed of this question in a manner entirely to the advantage of the Chinese Government.

ORGANIZATION AND ACTIVITIES OF MINISTRY OF COMMUNICATIONS.

DEVELOPMENT AND GENERAL FUNCTIONS.

The first step toward the organization of a board for the central control of railways was an edict issued in 1898. Kent gives a translation of a portion of this edict, as follows:

Railways and mines are nowadays the most important enterprises in this Empire. * * * We are, however, apprehensive, in view of the number of Provinces in the Empire and the various conditions of men who will attempt to open mines of all sorts in the future, that a diversity of methods and ensuing confusion will be the result, which would, of course, be detrimental to the principal object we have of getting the fullest advantages obtainable out of each and every undertaking in this direction.

It is therefore highly important that there should be a central bureau to direct, under a single system, the working and exploitation of mines and railways in the Empire, and we hereby command that a Bureau of Control for Railways and Mines be established in Peking, to the two chief commissionerships of which we now specially appoint two ministers of the Tsung-li Yamen, namely, Wang Wen-shao and Chang Yin-huan.

The said two chief commissioners shall from henceforth have special control over the opening of mines and construction of railways throughout the Empire, and companies formed for the above purposes will in future be required to apply to the said commissioners for permission and guidance in their operations.

This board went out of existence when the Tsung-li Yamen was discontinued. The next step was the establishment of the Board of Communications (Yu Chuan Pu, Chinese name) by the imperial edict of November 6, 1906, to control the systems of railways, posts, telegraphs and telephones, and steam navigation. This name was changed to the Ministry of Communications (Chiaotung Pu) after the establishment of the Republic, and the latter designation has been generally employed in this report. There is a president and vice president, with a staff for the direction of the several departments.

The general administration of the departments of posts and telegraphs and telephones is handled by the Ministry of Communications. The railway administration is in general along the following lines:

The Chiaotung Pu (Ministry of Communications) is the contracting branch of the Chinese Government for the financing and construction of new railways and the extensions, additions, and betterments to existing lines.

ACCOUNTS.

A Commission for the Unification of Railway Accounts and Statistics was created in 1913. Hon. K. C. Yih, then director-general of railways and now vice president of the Ministry of Communications, was and still is chairman; Dr. C. C. Wang, then associate director and now managing director of the Peking-Hankow Railway, was and still is vice chairman; and Dr. Henry C. Adams, of the United States, acted as adviser. The result of this commission has been the working out and adoption for use on all the Chinese Government Railways of an excellent system of unified accounts and statistics. The membership of the present standing committee is as follows:

Chairman: Hon. Yih Kung-Chau, vice president, Ministry of Communications.
Vice chairman: Dr. Wang Ching-chun, managing director Peking-Hankow Railway.

Member: C. S. Liu, chief accountant, Ministry of Communications.

Member: H. C. Chang, Ministry of Communications.

Member: Y. C. Wang, Ministry of Communications.

Member: S. F. Yih, Ministry of Communications.

Member: H. G. Yu, Ministry of Communications.

Member: H. Y. Hu, Ministry of Communications.

Member: C. K. Tsao, Ministry of Communications.

Member: W. Henderson, Peking-Mukden Railway.

Member: H. C. Lee, Peking-Suiyuan Railway.

Member: K. Y. Pao, Tientsin-Pukow Railway.

Member: T. K. Tcheng, Peking-Hankow Railway.

Member: B. Billion, Peking-Hankow Railway.

Member: T. Cheu, Cheng-Tai Railway.

Member: A. Louillet, Pienlo Railway.

Member: Souen-Souen, Pienlo Railway.

Member: C. P. Yin, Shanghai-Nanking Railway.

Member: H. Middleton, Shanghai-Nanking Railway.

Member: T. G. J. Brown, Canton-Hankow Railway.

Member: C. L. Chen, Canton-Hankow Railway.

The system of accounts is certainly one of the best, if not actually the best, that has ever been worked out in any country up to this time. It provides for classification of capital expenditures, operating revenue, operating expenses, income account, profit and loss account, and general balance sheet, and, in addition, provides a very excellent arrangement of a classified surplus appropriation account, which might be adopted to advantage in the American system of railway accounts.

In adopting the various features careful study was made of all the other systems of accounts in use, and, as the methods on the various railways in China represented nearly all known practices, full advantage was taken of the good points of each. In view of the beneficial results accruing from the work of this commission, the outlook would seem hopeful for unifying some of the other features of the Chinese railways as suggested later in this report.

PURCHASES.

As a rule, purchases are made by the managements of the different railways, particularly in a number of cases where a certain procedure is required by the railway loan agreement; but there have been a number of instances in which certain purchases have been directed or consummated by the Ministry of Communications, and it appears that there is a decided tendency on the part of the Ministry to take over the handling of certain classes of purchases. The purchases for the departments of posts and telegraphs and telephones are largely handled directly by the Ministry of Communications, and it is very likely that in the course of time this practice will increase in connection with the purchase of railway requirements, with the ultimate result that all purchases for all these departments will be handled by this central organization. Equipment for the joint use of a number of the lines (such, for instance, as freight cars) might be bought through an equipment trust certificate scheme, and this may be regarded as a probable future arrangement. Such negotiations will probably be handled by the Ministry of Communications.

CONSTRUCTION OF NEW LINES.

The general direction of all new lines of railway is under the jurisdiction of the Ministry of Communications. For the larger projects, such as the Hukuang Railways, it is the rule to have a director general in charge of the entire set of projects and, in addition, a managing director in charge of the different railways, such as the Canton-Hankow line. The approval of locations, plans, and specifications and the inviting and accepting of tenders are supervised through the director general and the managing directors.

REGULATION OF FARES AND RATES.

There is, it may be said, no commercial traffic department in the Chinese Government railways organization. The conduct of transportation and the commercial arrangements both come under what (as on the Australian railways) is called the traffic department.

The shortage of freight equipment of all classes has been chronic on all the lines for several years past, and the railways have moved what freight they could handle with the equipment they had, so there has been little occasion to have an organization for soliciting business. One result of this condition has been that there is very little interchange of business between the different lines, since each railway will not allow its cars to get away onto the other lines, although the per diem is usually \$3 Mex. for a 20-ton car and a pro rata charge for cars of larger capacity. There are seldom through rates in effect between the different lines. In a number of instances there are forwarding companies that take the shipments on the originating line, look after trans-shipments at junction points, and follow over the terminating line; but such companies, of course, have to make their profits and pay all the various kinds of expenses, so the combined cost is high—especially when there is any "squeeze" prevailing, which is said frequently to be the case.

The Ministry of Communications exercises very little actual direction over the commercial traffic; instead, this comes almost entirely under the direction of the management of the several railways, each

system issuing its own tariffs and traffic regulations. No tariffs are issued by the Ministry of Communications.

PASSENGER FARES.

First-class, second-class, and third-class fares prevail on all the lines, and on some lines, such as the Tientsin-Pukow, there is what is called a "coolie rate," which in effect is a workman's or laborer's rate. The fares on the Peking-Mukden and Tientsin-Pukow, which can be considered typical, are approximately as follows: First-class, 6 cents; second class, 4 cents; third class, 2 cents; Tientsin-Pukow coolie rate, 1 cent. All these are Mexican cents. On the Peking-Suiyuan line the rates are 6.5 cents (Mex.), 4½ cents, and 2½ cents, but the passenger travel on this line is light as compared with that on the Peking-Mukden line. The Shanghai-Nanking fares, on account of water competition, are lower than those above mentioned and are approximately as follows: First class, 4.25 cents (Mex.); second class, 2.35 cents; third class, 1.15 cents; coolie class, 0.75 cents.

The percentage of first and second class travel is small, and the third class constitutes the bulk of the business on all the lines. The following table—an analysis of passenger service during 1916—shows these percentages on the Peking-Mukden and Tientsin-Pukow lines, which are considered typical. The total number of passengers carried on the Peking-Mukden was 3,671,254, from which the revenue was \$6,215,460 Mex., and the Tientsin-Pukow carried 2,914,188, from which the revenue was \$4,273,746 Mex.

Class of service.	Peking-Mukden.			Tientsin-Pukow.		
	Number carried.	Passenger miles.	Revenue.	Number carried.	Passenger miles.	Revenue.
Ordinary:	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
First class.....	1.73	1.99	5.57	.43	2.09	6.72
Second class.....	2.20	2.39	4.42	.83	1.60	3.44
Third class.....	90.83	88.27	78.28	60.72	60.00	64.76
Coolie.....	.00	.00	.00	32.41	21.27	10.98
Government:						
Civil.....	.19	.70	.38	(a)	(a)	(a)
Military.....	4.52	5.83	3.65	5.33	13.71	8.21
Privilege.....	.45	.74	.43	.05	.29	.17
Excursion and season tickets.....	.08	.09	.10	.43	1.07	.71
Excess fares.....			.08			.07
Sleeper charges.....			.32			.81
Baggage.....			2.50			3.12
Postal.....			2.45			
Total.....	100.00	100.00		100.00	100.00	

a Less than one-half of 1 per cent.

First-class passengers are usually allowed 150 pounds of baggage free, second class 100 pounds, and third class 80 pounds. Excess is charged at the rate of ½ cent (Mex.) per mile for each picul (133½ pounds). As a matter of fact, particularly in the case of third-class passengers, a very large amount of luggage is carried in the cars by the passengers. This tendency is accentuated by the fact that the registering (checking) is attended with some trouble and risk of loss and the payment for lost baggage is rather small, amounting in no case to more than \$50 Mex. for a piece of first-class baggage and less for the lower classes. On most lines, however, there is an

arrangement for insurance of baggage when it is checked. The allowable amounts are from \$50 to \$200 Mex., and the premium is at the rate of 1 per cent.

Figure 25, facing page 97, shows a type of baggage truck used on the Peking-Hankow Railway, and the luggage shown is typical of the miscellaneous materials shipped as passengers' baggage.

FREIGHT RATES.

Again taking the Peking-Mukden as typical of the Chinese Government Railways, one finds the freight rates per mile and classifications in effect as shown by the following table. This same table shows the rates in effect on the Peking-Suiyuan line:

Railway and units of weight.	Dangerous.	Class 1.	Class 2.	Class 3.	Class 4.
PEKING-MUKDEN RAILWAY.					
Per picul (133½ pounds).....	Mex. dollars. 0.050	Mex. dollars. 0.0350	Mex. dollars. 0.0333	Mex. dollars. 0.0025	
Per ton of car-carrying capacity.....	.075	.0500	.0350	.0175	
PEKING-SUIYUAN RAILWAY.					
Per picul (133½ pounds).....	.044	.0058	.0047	.0035	0.0023
Per ton (2,240 pounds) per mile.....	.073	.0590	.0470	.0320	.0290

Dangerous and offensive goods are included in the "dangerous" classification. Class 1 includes the majority of merchandise. The Peking-Suiyuan classification tends to give actually a lower rate, for the reason that there are more articles in the lower classes.

On the Peking-Mukden the minimum haul charged for is 35 miles, except in some special cases, when this is reduced to 30 miles. A demurrage charge of \$10 Mex. per day is made for a 20-ton car, and cars of other capacities are charged for pro rata for any time in excess of 12 hours for unloading or loading. The Peking-Suiyuan rate is \$6, Mex., for a 20-ton car, with cars of other capacities pro rata. No car-performance statistics are available for the Chinese Government Railways, but it is quite obvious that they are getting full use of their equipment. It is stated that the average freight car completes a full cycle of loading, movement, and unloading every five days.

The rules regarding fines that are effective on the Peking-Suiyuan line seem sufficiently interesting to warrant the reprinting of the actual text of them:

RULE 4.—The consignor must report to the station master the exact weight in piculs and the number of pieces of retailed goods, and if this is falsely declared he will be fined 5 times the ordinary freight on any excess weight within 10 piculs, 10 times within 20 piculs, and 30 times when it is over 20 piculs.

RULE 5.—Cars should be loaded according to their tonnage capacity. A 10-ton car can be loaded 1 picul over its carrying capacity, a 20-ton car 2 piculs, and a 30-ton car 3 piculs. The consignor will be fined 5 times the ordinary freight on any excess weight up to 1 ton, 10 times up to 2 tons, and 30 times when it is over 2 tons.

RULE 6.—Seventy per cent of the fines charged on excess weight found either at intermediate or receiving stations will belong to the station, and 30 per cent will be awarded to the discoverers. On the other hand, if the man who weighed the goods at the stations purposely gave a wrong weight, then these men and the owners of the goods must each pay half the fine, or they may be put under arrest if the case is serious.

ORGANIZATION OF CHINESE GOVERNMENT RAILWAYS.

As already stated, the Ministry of Communications is organized for the regulation rather than for participation in the administration of the railways. At present there is a closer supervision of the accounts than of any other branch of the railway department, with a tendency toward extending the supervision or direction of purchases, which may, in the course of time, be centralized in Peking so far as the loan agreements will permit this to be done. General regulations governing the organization, grading of salaries, free travel, and similar matters are promulgated from time to time.

The following is a translation from the Chinese text of the regulations promulgated August 31, 1916, covering the organization for the construction period and for maintenance and operation after the completion of construction. It represents, in general, the organization now in effect on all the principal railways coming under the direction of the Ministry of Communications. It should be understood that these regulations are in no way effective on any of the foreign railways.

1. Previous to the establishment of the official system the organization of Government railway offices shall be in accordance with these regulations.

2. Administration offices and construction offices of Government railways shall be under the immediate control of the Ministry of Communications. The names of such offices and the lines under their control will be designated in the regulations governing the organization of those offices.

3. Railway administration offices shall have charge of the traffic, maintenance, business, and accounts of the whole line and of all other matters pertaining thereto.

The extension of new lines and the addition of branch lines shall be carried out by the administration offices concerned.

4. Railway administration offices shall establish the following departments for the management of the affairs listed in article 3: (1) General department, (2) traffic department, (3) engineering department, (4) locomotive department, and (5) accounts department.

These departments may, according to special circumstances existing in a particular administration office, be combined, or the duties of a particular department may be attended to by an officer of another department.

5. Railway construction offices shall have charge of the survey, construction, establishment, and accounts of the whole line and of all matters pertaining thereto.

In case traffic is commenced on one section before the construction of the whole line is completed, the traffic business shall be managed by the construction office. Upon the completion of construction work the construction office shall be changed to an administration office.

6. Railway construction offices shall establish the following departments for the management of the affairs listed in article 5: (1) General department, (2) engineering department, and (3) accounts department.

Construction work may be divided into sections and a construction department created.

The provisions given in paragraph 2 of article 4 may be applied to railway construction offices.

Upon the commencement of traffic on any one section a traffic department may be established for the management of that business.

7. The officers of an administration office or a construction office shall be as follows: Director, assistant director, chief of construction department, chiefs of departments, chiefs of subdepartments, general officers, chiefs of sections, assistant chiefs of sections, station masters, assistant station masters, chiefs of train squads, chief engineer, engineers, engineering assistants.

There are chiefs and assistant chiefs of sections in the traffic, engineering, and locomotive departments. There are engineers and engineering assistants in the engineering and locomotive departments.

The officers listed in paragraph 1 may be appointed according to the individual requirements of the railway offices.

8. The director of a railway shall be appointed by the Minister of Communications and shall receive his orders from the Minister of Communications regarding all matters concerning his railway and shall have supervision of all subordinate officers under him.

9. The assistant director of a railway shall be appointed by the Minister of Communications to assist the director in the management of affairs.

10. The chief engineer, chief of construction department, and chiefs of departments shall be appointed by the Minister of Communications and shall obey the orders of their superior officers in the management of the affairs of their respective departments.

11. Chiefs of subdepartments, engineers, and chiefs of sections shall be appointed by the Minister of Communications upon the recommendation of the director and shall obey the orders of their superior officers in the performance of their respective duties.

12. General officers, assistant chiefs of sections, station masters, assistant station masters, and engineering assistants shall be appointed by the director, but all such appointments shall be reported to the Minister of Communications for record.

13. Railway administration offices and railway construction offices, according to the length of the line and the amount of business, shall be classified as first-class, second-class, or third-class offices. The grading of these offices and the number of officers in them will be defined in a separate table.

14. Railway administration and construction offices may employ such clerks and writers as may be required.

15. Regulations governing the appointment of officers of Government railway offices, their grading, salaries, and the employment of clerks and writers, will be promulgated separately.

16. Any provisions in these regulations that may be in conflict with mandates or agreements concerning Government railways may be considered as void in these special cases.

17. These regulations shall take effect one month from the date of promulgation.

The salaries of officers are governed by regulations issued by the Ministry of Communications. Station masters (station agents), assistant station masters, and chiefs of train squads (train conductors) are ranked as officials. The following is a translation from the Chinese text of the regulations now in effect on the Government railways, issued under date of October 20, 1916, and effective November 1 of that year:

1. The salaries of all officers of Government railways, except those engaged under contracts, shall be paid in accordance with these regulations.

2. The salaries of officers of Government railways shall be divided into 48 grades, in accordance with the form showing the grading of monthly salaries.

3. Officers of Government railways are classified as follows:

Officers of first-class offices shall be paid according to classification No. 1.

Officers of second-class offices shall be paid according to classification No. 2.

Officers of third-class offices shall be paid according to classification No. 3.

4. The grading of directors, assistant directors, chief engineers, chiefs of construction departments, chiefs of traffic, locomotive, engineering, and accounts departments shall be determined by the Minister of Communications. The grading of chiefs of subdepartments, engineers, and chiefs of sections shall be determined by the Minister of Communications on the recommendation of the director. The grading of general officers, assistant chiefs of sections, station masters, assistant station masters, chiefs of train squads, and engineering assistants shall be determined by the director, but shall be reported to the Minister of Communications for record.

5. In the grading of officers of Government railways the Minister of Communications or the directors shall consider the work of the officer, his qualifications, his performance of duty, and the results attained in his work. Promotion above the twenty-seventh grade will not be made for service of less than one year, and below the twenty-seventh grade for less than half a year's service.

The directors shall report to the Minister of Communications all promotions of officers under them.

6. Directors, assistant directors, chiefs of construction departments, and chief engineers may be given special allowances. The amounts shall be determined by the Minister of Communications but shall not exceed half a month's salary.

7. In the matter of traveling allowances the directors shall follow the rules as fixed by the Ministry of Finance governing the traveling expenses of Government officials.

8. There shall be detailed regulations governing the payment of salaries and deduction of salary for absence.

9. These regulations shall take effect from November 1.

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FIG. 7.—TYPICAL WAY STATION ON THE GERMAN-BUILT RAILWAYS IN CHINA.



FIG. 8.—TYPICAL WAY STATION ON THE CHINESE-BUILT PEKING-SUIYUAN RAILWAY.

8. The director of a railway shall be appointed by the Minister of Communications and shall receive his orders from the Minister of Communications regarding all matters concerning his railway and shall have supervision of all subordinate officers under him.

9. The assistant director of a railway shall be appointed by the Minister of Communications to assist the director in the management of affairs.

10. The chief engineer, chief of construction department, and chiefs of departments shall be appointed by the Minister of Communications and shall obey the orders of their superior officers in the management of the affairs of their respective departments.

11. Chiefs of subdepartments, engineers, and chiefs of sections shall be appointed by the Minister of Communications upon the recommendation of the director and shall obey the orders of their superior officers in the performance of their respective duties.

12. General officers, assistant chiefs of sections, station masters, assistant station masters, and engineering assistants shall be appointed by the director, but all such appointments shall be reported to the Minister of Communications for record.

13. Railway administration offices and railway construction offices, according to the length of the line and the amount of business, shall be classified as first-class, second-class, or third-class offices. The grading of these offices and the number of officers in them will be defined in a separate table.

14. Railway administration and construction offices may employ such clerks and writers as may be required.

15. Regulations governing the appointment of officers of Government railway offices, their grading, salaries, and the employment of clerks and writers, will be promulgated separately.

16. Any provisions in these regulations that may be in conflict with mandates or agreements concerning Government railways may be considered as void in these special cases.

17. These regulations shall take effect one month from the date of promulgation.

The salaries of officers are governed by regulations issued by the Ministry of Communications. Station masters (station agents), assistant station masters, and chiefs of train squads (train conductors) are ranked as officials. The following is a translation from the Chinese text of the regulations now in effect on the Government railways, issued under date of October 20, 1916, and effective November 1 of that year:

1. The salaries of all officers of Government railways, except those engaged under contracts, shall be paid in accordance with these regulations.

2. The salaries of officers of Government railways shall be divided into 48 grades, in accordance with the form showing the grading of monthly salaries.

3. Officers of Government railways are classified as follows:

Officers of first-class offices shall be paid according to classification No. 1.

Officers of second-class offices shall be paid according to classification No. 2.

Officers of third-class offices shall be paid according to classification No. 3.

4. The grading of directors, assistant directors, chief engineers, chiefs of construction departments, chiefs of traffic, locomotive, engineering, and accounts departments shall be determined by the Minister of Communications. The grading of chiefs of subdepartments, engineers, and chiefs of sections shall be determined by the Minister of Communications on the recommendation of the director. The grading of general officers, assistant chiefs of sections, station masters, assistant station masters, chiefs of train squads, and engineering assistants shall be determined by the director, but shall be reported to the Minister of Communications for record.

5. In the grading of officers of Government railways the Minister of Communications or the directors shall consider the work of the officer, his qualifications, his performance of duty, and the results attained in his work. Promotion above the twenty-seventh grade will not be made for service of less than one year, and below the twenty-seventh grade for less than half a year's service.

The directors shall report to the Minister of Communications all promotions of officers under them.

6. Directors, assistant directors, chiefs of construction departments, and chief engineers may be given special allowances. The amounts shall be determined by the Minister of Communications but shall not exceed half a month's salary.

7. In the matter of traveling allowances the directors shall follow the rules as fixed by the Ministry of Finance governing the traveling expenses of Government officials.

8. There shall be detailed regulations governing the payment of salaries and deduction of salary for absence.

9. These regulations shall take effect from November 1.

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FIG. 7.—TYPICAL WAY STATION ON THE GERMAN-BUILT RAILWAYS IN CHINA.



FIG. 8.—TYPICAL WAY STATION ON THE CHINESE-BUILT PEKING-SUIYUAN RAILWAY.



FIG. 9.—OVERHEAD FOOTBRIDGE BETWEEN TRACKS AT TSINANFU ON THE TIENTSIN-PUKOW RAILWAY.



FIG. 10.—OVERHEAD FOOTBRIDGE BETWEEN TRACKS AT TANGSHAN ON THE PEKING-MUKDEN RAILWAY.

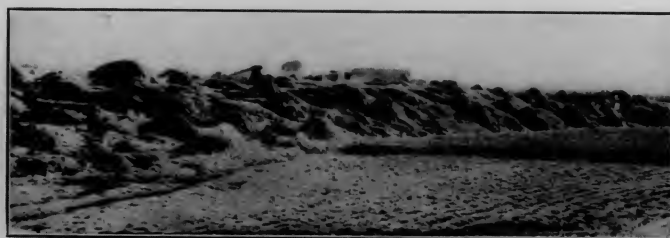


FIG. 11.—TYPICAL CHINESE GRAVEYARD AT TANGSHAN.

The monthly salaries of officers of Government Railways are:

Grade.	Amount.	Grade.	Amount.	Grade.	Amount.	Grade.	Amount.
	<i>Mex. dollars.</i>		<i>Mex. dollars.</i>		<i>Mex. dollars.</i>		<i>Mex. dollars.</i>
1.....	800	13.....	360	25.....	180	37.....	80
2.....	750	14.....	340	26.....	170	38.....	75
3.....	700	15.....	320	27.....	160	39.....	70
4.....	650	16.....	300	28.....	150	40.....	65
5.....	600	17.....	285	29.....	140	41.....	60
6.....	550	18.....	270	30.....	130	42.....	55
7.....	500	19.....	255	31.....	120	43.....	50
8.....	475	20.....	240	32.....	110	44.....	45
9.....	450	21.....	225	33.....	100	45.....	40
10.....	425	22.....	210	34.....	95	46.....	35
11.....	400	23.....	200	35.....	90	47.....	30
12.....	380	24.....	190	36.....	85	48.....	25

The following table shows the classification of salaries on the Chinese Government Railways:

Employees.	Classification No. 1.	Classification No. 2.	Classification No. 3.
	<i>Grade.</i>	<i>Grade.</i>	<i>Grade.</i>
Directors.....	1 to 3	4 to 7	7 to 12
Assistant directors.....	5 to 7	7 to 13	13 to 16
Chiefs of construction departments.....	5 to 7	7 to 13	13 to 16
Chiefs of departments.....	8 to 14	11 to 16	16 to 20
Chiefs of subdepartments.....	16 to 23	20 to 26	23 to 28
General officers.....	25 to 43	27 to 44	29 to 45
Chiefs of sections.....	15 to 35	18 to 39	20 to 37
Assistant chiefs of sections.....	25 to 43	27 to 44	29 to 45
Station masters.....	28 to 43	30 to 36	33 to 43
Assistant station masters.....	37 to 46	39 to 45	39 to 48
Chiefs of train squads.....	37 to 46	39 to 45	39 to 48
Chief engineers.....	1 to 3	4 to 7	7 to 12
Engineers.....	11 to 30	14 to 32	16 to 33
Engineering assistants.....	25 to 43	27 to 44	29 to 45

NOTE.—Chiefs of shops in railways of the first class may be graded up to the eleventh grade, those in railways of the second class to the fifteenth grade, and those in railways of the third class to the eighteenth grade.

For each of the principal Chinese Government Railways the Ministry has outlined a detailed administrative organization. The following is a translation from the Chinese text of the regulations promulgated October 20, 1916, for the Peking-Mukden Railway. These are similar to the regulations issued for the other lines, such as the Tientsin-Pukow and Peking-Hankow:

1. The Peking-Mukden Railway administration office shall have charge of the railway line between Peking and Mukden and its branch lines.
2. The Peking-Mukden Railway administration shall have charge of such matters as are outlined in article 3 of the regulations governing the organization of Government railways.
3. The Peking-Mukden railway administration shall, in accordance with the provisions of article 4 of the regulations governing the organization of Government railways, have the following departments: (1) General department, (2) traffic department, (3) engineering department, (4) locomotive department, and (5) accounts department.
4. The general department shall be divided into the following subdepartments for the distribution of work:

The secretarial department shall have charge of all clerical work, files, confidential matters, the seal, the receipt and dispatch of correspondence, and the efficiency records of all employees of the railway.

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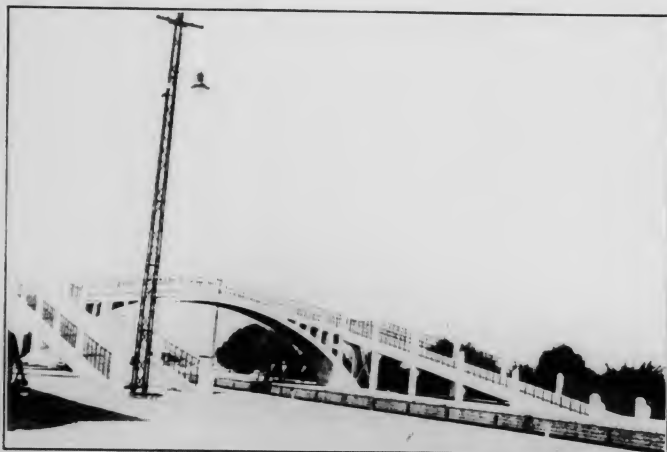


FIG. 9.—OVERHEAD FOOTBRIDGE BETWEEN TRACKS AT TSINANFU ON THE TIENTSIN-PUKOW RAILWAY.



FIG. 10.—OVERHEAD FOOTBRIDGE BETWEEN TRACKS AT TANGSHAN ON THE PEKING-MUKDEN RAILWAY.



FIG. 11.—TYPICAL CHINESE GRAVEYARD AT TANGSHAN.

CHINA.

65

The monthly salaries of officers of Government Railways are:

Grade.	Amount.	Grade.	Amount.	Grade.	Amount.	Grade.	Amount.
	<i>Mex. dollars.</i>		<i>Mex. dollars.</i>		<i>Mex. dollars.</i>		<i>Mex. dollars.</i>
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2.....	750	14.....	340	26.....	170	38.....	75
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Chiefs of subdepartments.....	16 to 23	20 to 26	23 to 28
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Station masters.....	28 to 43	30 to 36	33 to 48
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Chief engineers.....	1 to 3	4 to 7	7 to 12
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1. The Peking-Mukden Railway administration office shall have charge of the railway line between Peking and Mukden and its branch lines.

2. The Peking-Mukden Railway administration shall have charge of such matters as are outlined in article 3 of the regulations governing the organization of Government railways.

3. The Peking-Mukden railway administration shall, in accordance with the provisions of article 4 of the regulations governing the organization of Government railways, have the following departments: (1) General department, (2) traffic department, (3) engineering department, (4) locomotive department, and (5) accounts department.

4. The general department shall be divided into the following subdepartments for the distribution of work:

The secretarial department shall have charge of all clerical work, files, confidential matters, the seal, the receipt and dispatch of correspondence, and the efficiency records of all employees of the railway.

The stores department shall have charge of the purchase and distribution of stores. The translation department shall be responsible for compilations and translations and all matters of negotiation with foreigners.

The business department shall have charge of special transportation, improvement of traffic, and other regular business.

The compilation department shall have charge of statistics, regulations, compilations, and investigations.

The electrical department shall have charge of the telegraph and telephone systems of the railway.

The police department shall be responsible for the policing and medical service of the railway.

The general-affairs department shall have charge of all miscellaneous general matters and of all other matters not under the charge of other departments.

The Hsinho Stores department shall be responsible for the care, receipt, issue, and marking of materials.

5. The traffic department shall be divided into the following subdepartments for the distribution of work:

The secretarial subdepartment shall have charge of the files, clerical work, and the efficiency records of the members of the department not under the control of any other department.

The transportation department shall have charge of the business of transportation, cars, and water transportation.

The checking department shall have charge of the checking of mileage and passenger and freight tickets.

Traffic sections and subsections shall be responsible for all traffic matters in their respective sections.

Stations shall be responsible for all matters in their respective districts.

6. The engineering department shall be divided into the following departments for the distribution of work:

The secretarial department shall have charge of the files, clerical work of the department, and the efficiency records of the members of the department not under the control of any other department.

The construction department shall have charge of the planning, mapping, and execution of work and of all materials of construction and land.

Engineering divisions and subdivisions shall be responsible for the engineering work in their respective divisions.

The Shanhaikwan Iron Workshops shall be responsible for the making of all iron and steel machinery and parts and for the repair of bridges.

7. The locomotive department shall be divided into the following subdepartments for the distribution of work:

The secretarial department shall have charge of the files and clerical work of the department and the efficiency records of the members of the department not under the control of any other department.

The works department shall have charge of the planning, mapping, and execution of work and locomotives.

The Tangshan workshops shall be responsible for the repair and erection of cars, locomotives, and machinery and the training of mechanical workmen.

The Kaopantze branch workshops shall be responsible for the making, repair, and erection of cars and machinery.

Locomotive sections and subsections shall be responsible for all locomotive affairs within their respective sections.

8. The accounts department shall be divided into the following subdepartments for the distribution of work:

The secretarial department shall have charge of the files and clerical work of the department and the efficiency records of the members of the department not under the control of any other department.

The accounting department shall have charge of the budgets and statements of accounts, the auditing of accounts, the transfer of funds, and account books.

The cashier department shall be responsible for the receipt and disbursement of moneys of the railway.

The checking department shall check all passenger and freight tickets and shall be responsible for their printing.

9. There shall be one chief to each subdepartment provided for in these regulations, and one superintendent in charge of each workshop.

10. The titles and number of officers of the Peking-Mukden Railway administration shall be as listed below.

11. Foreign employees of the Peking-Mukden Railway administration shall perform such duties as are specified in their contracts. In case of a change or extension of contract, the approval of the Minister of Communications must first be obtained.

In case Chinese employees are engaged in fulfillment of conditions of agreements with the approval of the Minister of Communications, where the positions are not provided in the regulations governing the organization of Government railways, such employees shall retain their old titles in the performance of their respective duties.

12. The detailed regulations for the office, subdepartments, workshops, and police of the Peking-Mukden Railway administration shall be prepared by the director and submitted to the Minister of Communications for approval.

13. These regulations shall take effect from the date of promulgation.

The list of titles and number of officers in the Peking-Mukden Railway administration are as follows: Director, 1; assistant director, 1; chiefs of departments, not more than 5; superintendents of workshops, 4; chiefs of subdepartments, not more than 19; general officers, not more than 100; chiefs of sections, 1 for each section; chiefs of subsections, 1 for each subsection; station masters, 1 for each station; assistant station masters, not more than 60; chiefs of train squads, not more than 70; chief engineer, 1; engineers, not more than 9; engineering assistants, not more than 16.

It will be noticed from the above that this organization is typical of the so-called departmental organization, or what the writer termed the "branch" organization in his Australasian report (Special Agents Series No. 156). This remark will apply also to the Japanese Imperial Railways and the South Manchuria Railway Co. in South Manchuria and Chosen (Korea).

PURCHASE OF STORES BY RAILWAYS.

In each instance the purchase, care, and distribution of stores are handled by a subbranch of the general department and, as a rule, this subbranch is a part of or directly connected with the financial subbranch.

On account of the great distance from the source of supply, it is a matter of great importance to carry such stores as will actually be needed, particularly in emergencies, and at the same time not have an unwarranted amount of money tied up in a supply of parts that may become obsolete in the course of time. The considerations with respect to stores constitute one of the very potent influences tending toward the longer life of equipment that prevails in all the Far Eastern countries. The much more complex method of payment for stores, with all the involved questions of exchange, is alone sufficient reason for requiring the stores-branch to be closely supervised by the financial branch.

There is a growing practice of advertising for tenders covering requirements by the various lines, and the following are typical of advertisements that are now frequently appearing in the Peking, Shanghai, Tientsin, and Hankow papers:

KIN-HAN RAILWAY INVITES TENDERS FOR SUPPLY OF STEEL BRIDGES AND MISCELLANEOUS MATERIALS.

1. Tenders for the supply of a number of steel bridges to be opened on the 5th of January, 1918.

2. Tenders for the supply of miscellaneous materials for ordinary purposes to be opened on the 1st of February, 1918.

For further information, apply to the Kin-Han Railway (Technical Secretariat), where, commencing on the 5th of November, plans, drawings, and specifications may be obtained on payment of ten dollars per copy for bridges and five dollars a copy for miscellaneous materials.

THE TIENTSIN-PUKOW RAILWAY ADMINISTRATION.

Notification No. 265.

INVITATION OF TENDERS (138/2).

The public is hereby notified that tenders are invited for the supply to this railway of the following quantities of sleepers, bridge ties and crossing timbers, viz:

One hundred and seventy thousand pieces of first-class Japanese oak or other hardwood of similar quality railway sleepers to be delivered, cost, insurance, and freight, including custom duty and war risk, at our Chentangchuang wharf.

Three hundred and seventy-nine pieces of first-class Japanese oak or hainin or Oregon pine or other hardwood of similar quality crossing timbers to be delivered; cost, insurance, and freight, including customs duty and war risk, at our Chentangchuang wharf.

Thirty thousand pieces of first-class Japanese oak or other hardwood of similar quality railway sleepers to be delivered, cost, insurance, and freight, including customs duty and war risk, at our Pukow wharf.

One thousand five hundred pieces of first-class Japanese oak or other hardwood of similar quality bridge ties to be delivered, cost, insurance, and freight, including customs duty and war risk, at our Pukow wharf.

One thousand two hundred pieces of first-class Japanese oak or hainin or Oregon pine or other hardwood of similar quality crossing timbers to be delivered, cost, insurance, and freight, including customs duty and war risk, at our Pukow wharf.

Tender forms attached with specifications and full particulars may be obtained free of charge on application to the head office of the railway, Tientsin, Hopei.

Tenders must be signed, sealed, and marked "tender for the supply of sleepers, bridge ties, and crossing timbers" and addressed to the managing director, Tientsin-Pukow Railway Administration, Tientsin. The same must reach the above address on or before 12 o'clock, noon, of the 12th day of November, 1917, and will be opened at 3 o'clock in the afternoon of the same day.

The order or orders for the goods will be given to the tendering firm or firms, whose tenders have been accepted, not later than the 26th of November, 1917, during which time and including which date the prices of all tenders must hold good.

No tenders will be entertained unless presented within the time given and made on the forms supplied by this railway.

The managing director does not bind himself to accept the lowest or any of the tenders and reserves the right of placing the order in lots.

(Signed) S. C. SHU,
Managing Director,
The Tientsin-Pukow Railway Administration.

TIENTSIN, 25th October, 1917.

It will be noticed from the Peking-Hankow (Kin-Han) advertisement that there is a charge for the specifications and plans. Such a charge is the general practice of all the lines, but as a rule specifications are furnished without charge to the established concerns from which it is desired to secure bids. The second item of the Peking-Hankow invitation represents the first instance in which invitations have been issued for tenders covering miscellaneous merchandise supplies. It is probable, however, that annual or even two or three year contracts for miscellaneous merchandise supplies will become the rule on the Chinese Government Railways. This practice prevails on the Australian State Railways, and there seems to be a decided tendency for government owned and operated railways to buy their miscellaneous merchandise requirements, so far as practicable, by this method of purchase. The bridges wanted by the Peking-Hankow line are to replace the considerable number of bridges lost during the unusual floods in the summer of 1917.

OPERATING METHODS.

The system of train-movement control is the "station-master method" of operation, as the writer termed the arrangement em-

ployed on Australian railways. The practice of putting in the hands of the station master the responsibility for the movement of all traffic is even more pronounced in China than in Australia. It may be said to represent the adaptation of the British and Continental methods to the situation in China, where there are many factors in labor and class conditions that justify such an arrangement. In fact, it would probably be impossible to use successfully the American dispatching methods with the train crews carrying out such orders without other direction.

All employees of the Chinese Government Railways are Chinese, except for a few salaried official positions that are filled by foreigners, usually serving under definite contracts. Educated Chinese are employed to fill many of the salaried official positions, but the less important employees, in station, train staff, and similar service, have been recruited from the less-educated classes, and they require education and training to make them capable railway servants. Therefore the "station-master method" of operation seems without question to be the most desirable practice for railways in the Far East, and it is the method in general use. There is no doubt that this method requires more men and is less expeditious than the methods in vogue in the United States, particularly in the running of passenger trains, but this is not a serious handicap.

SIGNALING.

The government of train movements is usually by block control. Some kind of staff is generally in use on single-track lines and a very large percentage of all the mileage is single track. All stations where trains may meet or pass are provided with "station loops," which are really very short stretches of double track. Separate station platforms are provided for the passenger traffic in each direction. At the more important stations, particularly at junction stations, the main-track switches are interlocked; at other stations interlocking of various degrees of completeness is provided; while at some stations—in fact, in a large number of instances—only hand-thrown switches, locks, and signals are provided. In all cases the direction of the handling of this apparatus is under the jurisdiction of the station master. The method of signaling is usually in accordance with the practices of the country that has provided the loan funds for building the line, but in the main, the general practice can be said to conform approximately to the British Board of Trade practice. In view of the experience in Australia, it would seem, if the Chinese Government Railways should be able to make their practice uniform in the next few years, that it would be wise for them to adopt the American three-position, three-speed system of signaling. It is also probable that the arrangement of selective telephones with central control, as installed on the New South Wales Railways, could be adopted with much advantage on some of the lines, such as portions of the Peking-Mukden line, where the traffic is growing to such an extent as to require increased capacity of the present single track.

The signaling practice, as already stated, conforms to the practice of the country furnishing the loan funds, but the signaling as a rule is very simple, and approaches closely the British Board of Trade practice. Figures 17 and 18, facing page 76, show typical installations,

and are good examples of the two arms placed horizontally on separate dolls instead of vertically on one mast, as is the American practice. It would be of most decided advantage if all the Chinese railways were to adopt at once the American practice instead of doing so later (as they probably will) at a considerable cost. It will be noticed in both the illustrations mentioned above that the signal arms point to the left, because all the roads in China run left-handed.

The block-working apparatus is largely of British manufacture.

CONSTRUCTION AND MAINTENANCE METHODS.

All the present railways have been built almost entirely by hand labor, chiefly on account of the large supply of cheap and industrious labor in all parts of China. This applies even to the breaking of rock ballast, which has been done by hand. Bridge masonry, buildings, station platforms, and much similar work has been contracted for with Chinese subcontractors, and in some instances this procedure has been followed in the case of earth and rock grading work (called in China "formation"). With the supply of good cement, stone, and cheap labor, and in view of the scarcity and high price of lumber, there is a growing tendency to use concrete in every way possible, particularly as most Chinese laborers seem to make as good concrete workers as stonemasons.

The maintenance methods and tools are much the same on the several railways. The following data furnished by A. C. Clear, engineer in chief and general manager of the Shanghai-Nanking and the Shanghai-Hangchow-Ningpo Railways, and Mr. Ivon Tuxford, maintenance engineer of the same line, are fairly typical of all the lines, but the methods are probably worked out in more complete detail than is the case on some of the other lines. On this system the engineer in chief is in general charge of roadways, bridges, buildings, etc., the work being under the direct charge of a maintenance engineer, with district engineers in charge of districts. The district engineers have assistant engineers, usually in charge of about 100 miles of line, and, for the direct administration of the work, these assistant engineers have inspectors, who do not have more than 70 miles of line. The inspectors' territory is divided into sections of about 15 miles, and these again are divided into subsections, usually of 5 miles. There is a section foreman for each of the 15-mile sections, a gang for each 5-mile subsection, and a flying (extra) gang for each 20 miles of line.

The regular gangs for the 5-mile subsections consist of 1 ganger (foreman), 2 leading coolies, 10 coolies, and 1 cook, and the flying gangs consist of 1 ganger, 10 coolies, and 1 cook. Permanent gang-houses, consisting of three rooms and a kitchen, are provided for the regular gangs. The flying gangs, being constantly on the move, receive \$3 Mex. per month for house rent.

The following are the rates of pay for the above gangs; they are approximately the same as are paid in other parts of China for men of equal qualifications: Section foreman, \$25 Mex. to \$35 Mex. per month. Subsection gangs—Ganger (foreman), \$15 Mex. to \$20 Mex. per month; leading coolies, \$10.50 Mex.; coolies, \$8 Mex.; cooks, \$5 Mex.; level-crossing keepers (crossing watchmen), \$6.50 Mex. "Flying" gangs—Ganger, \$21 Mex. per month; coolies, \$9 Mex.; cook, \$5 Mex.

It will be noticed from the above that some of the wages are scaled. The section foremen, being seasoned, tried men, are paid according to experience. The development of this force and the scale of pay is explained in the following excerpt from a paper by Mr. Ivon Tuxford, published in the 1914-15 proceedings of the Engineering Society of China:

Gangers are mentioned from time to time in the monthly report by the divisional permanent way inspector, and if no complaint has been recorded for six months, they receive an increase in pay of \$1 per month, and as long as the section is maintained in good order and the gangs in a state of efficiency, without any complaints being recorded, an increase of \$1 per month every six months is given until the maximum pay for a ganger, \$20 per month, is obtained. Gangers receiving \$20 per month are eligible for promotion to section foremen. Leading coolies are eligible for promotion to gangers provided no complaints have been recorded against them after a period of at least 12 months' service.

Any complaints made in the monthly report against gangers are dealt with as follows:

For not turning out the gang in time, leaving work too soon, not carrying out instructions promptly, allowing coolies to neglect their work, not keeping the section neat and tidy, or similar misdemeanors gangers are punished in the first case by a reduction in pay of \$1 per month; second case, \$2 per month; third case, dismissal.

If, however, a ganger receives good reports for six months after the first complaint he receives his former pay, and such complaint does not stop his further advancement. After two complaints the ganger must receive good reports for six months before getting an increase of \$1. At the termination of 12 months' good conduct he reverts to his original pay, and the complaints do not stop his further advancement. The dismissal takes effect if two complaints are still recorded against the ganger when the third is made.

Every permanent-way gang coolie is medically examined, particularly as to sight and hearing, this being necessary for obvious reasons.

The Sunday holiday has also been introduced. This has a good effect on the men and better work is obtained by giving them this day off, enabling them to look after their gardens, etc., and relieving the monotony of continuous track work. At the same time inspection of track on Sundays is not neglected, the line being patrolled by the ganger and leading coolies of each gang as follows: First Sunday, ganger and first leading coolie; second Sunday, ganger and second leading coolie; third Sunday, two leading coolies.

Each section is patrolled twice a day.

The section foremen make surprise visits at irregular intervals to see whether the patrols are on duty, and the permanent-way inspector of the district also makes an occasional Sunday trip to see that the patrol work is being properly carried out.

The Sunday holiday is an incentive to make the gangs keep their sections neat and tidy and up to the required standard, as, if the section gets out of order or dirty through lack of weeding, or if any slackness on the part of the gang is shown, the Sunday holiday is canceled and the gang has to turn out until the section is in order again.

The question of paying a considerable number of men spread over a distance of 200 miles presents certain difficulties, especially as it is insisted upon that each coolie be paid personally by the pay clerk. The procedure is as follows: Every man is numbered, the number being in the form of a wooden ticket bearing the number of the gang and the number of the coolie wearing it. Being always paid on the same day each month and by the same train, the men know exactly at what time to leave their work and proceed to the nearest station. The permanent-way inspector travels with the pay clerk and, knowing which gangs will be at each station, checks their pay before the train reaches the particular station. The money, having been put up in small bags with each man's gang and number clearly marked and having been checked by the permanent-way inspector, is handed by the pay clerk to each coolie, who takes his pay from the bag, counts it and hands the empty bag back to the permanent-way inspector. This empty bag forms a receipt for the wages paid. Each man's pay is so proportioned in notes and silver that the permanent-way inspector can satisfy himself at a glance that the man has received his correct pay. To protect the coolies still further, as it is a general custom for the ganger to find food for the gang, a definite allowance is deducted from the coolies' pay and given to the ganger for this purpose. The ganger can not, therefore, overcharge them for their food. This is considered to be a better method of paying than that of handing the whole of the gang's money to the ganger for distribution to the coolies, as it ensures each coolie getting his proper pay without any deductions except from those who have been punished by fines.

The railway has in use a very successful and interesting system of reports, using a "picture" language, because the men are not sufficiently educated in their own or the English language to make satisfactory reports in either. This system requires their knowing only the English numerals 1 to 0.

ROADWAY AND BRIDGE MATERIALS.

In general, it may be said that on all the lines built with foreign loans the practices and standards of the country furnishing the money were very largely followed. On the lines built by Chinese engineers with Chinese money a considerable amount of American roadway and bridge materials, as well as American rolling stock, was always used, the most noticeable instance being the Peking-Suiyuan line, built in two sections—the first 125 miles known as the Peking-Kalgan and the second section as the Kalgan-Suiyuan, the last 110 miles of the latter being not yet completed.

BRIDGES.

One serious handicap from which the Chinese railways are now suffering and which it will be very expensive to remedy is the fact that all the bridges that have been built carry what American railway men consider very light loads. In only a few cases does the load exceed the equivalent of Cooper E-40, and in a number of instances it is as low as Cooper E-35. A good example is the Shantung Railway, where the Japanese management is desirous of using heavier motive power, but is unable to do so because the bridges only carry a load equivalent to Cooper E-35; there are about 1,000 structures involved, but most of them are short single spans. Each nation has followed its peculiar practice. The Germans, French, and Belgians use a style of floor system with a stringer carrying the rail, with no bridge ties and the space inside and outside the rails filled with metal plates. (See fig. 12.) This makes failure of the structure almost certain in case of derailment. This type of construction has been used on the Peking-Hankow, Cheng-Tai, Pienlo, and Shantung lines and the German section of the Tientsin-Pukow. The British have followed their standard practice (which applies also to all materials fabricated at the Shanhaikwan bridge works of the Peking-Mukden Railway), but their floor system is very similar to the American practice and does not have the above disadvantage in case of derailment.

It is also apparent that on some of the lines sufficiently large openings have not been provided. This has been forcibly demonstrated during the last year, particularly on the Peking-Hankow and the German section of the Tientsin-Pukow. On the first line the bridge construction has been much criticized. While the bridges are unquestionably very light, it is doubtful whether any set of engineers would have provided sufficient openings to take care of the excessive floods of the past year in this part of China. Figure 13 shows one of these bridges with both approaches washed away. The fact is that some of the lines will be compelled to do considerable reconstruction of their bridges in the future.

BUILDINGS.

On account of the great scarcity and high price of lumber, there is a decided tendency to construct railway buildings of all classes with

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FIG. 12.—BRIDGE ON THE FRENCH YUNNAN RAILWAY, SHOWING STRINGER TRACK CONSTRUCTION.

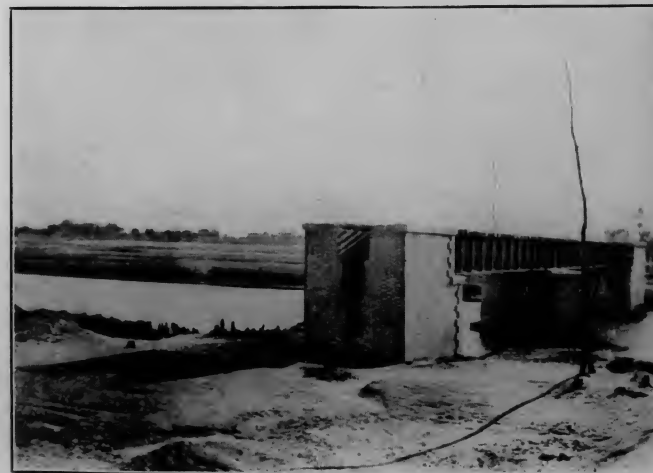


FIG. 13.—BRIDGE ON THE PEKING-HANKOW RAILWAY AFTER 1917 FLOODS.

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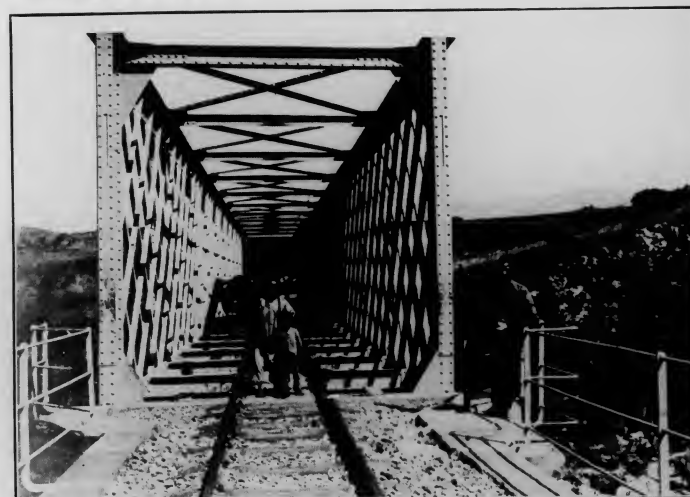


FIG. 12.—BRIDGE ON THE FRENCH YUNNAN RAILWAY, SHOWING STRINGER TRACK CONSTRUCTION.



FIG. 13.—BRIDGE ON THE PEKING-HANKOW RAILWAY AFTER 1917 FLOODS.



FIG. 14.—STEEL TIES (SLEEPERS) OF BELGIAN MANUFACTURE ON THE CANTON-SAMSHUI RAILWAY.



FIG. 15.—STEEL TIES (SLEEPERS) ON THE FRENCH YUNNAN RAILWAY, INDO-CHINA LINES.

brick, stone, or concrete. On most of the lines very substantial buildings of all classes have been provided, and, as already mentioned, in some instances these are elaborate and ornate. In many cases the buildings are erected by local contractors.

CROSSTIES.

The supply of crossties (sleepers) is a matter of the greatest importance to all the Chinese railways. No part of China, except portions of Manchuria, has any timber suitable for ties. In the past most of the ties used have come from the North Island of Japan, and this will probably remain the main source of supply for some years to come. These ties are termed Japanese oak, but about 70 per cent are oak and the other 30 per cent a mixture of Japanese katsura and tamo. In addition, apitong, Australian jarrah, mixed hardwoods, Hailin pine or Manchurian red pine, and Oregon pine have been used in varying quantities. The usual dimensions have been 6 by 9 inches by 8 feet, except in the case of the jarrah, which was 5½ by 9 inches by 8 feet. The apitong and jarrah, both being very dense, have to have holes bored for the track spikes.

The Tientsin-Pukow Railway advertisement shown on page 68 is a very good illustration of the present requirements and the methods of purchasing crossties.

Mr. G. A. Kyle, chief engineer of the Siems-Carey Railways, has made a careful analysis of the available data and the following table shows his conclusions; this is based on the use of untreated timber and ordinary track spikes, without tie-plates:

Items.	Japanese oak's.	Apitong.	Jarrah.	Hardwoods.	Hailin pine.	Oregon pine.
ESTIMATED LIFE.						
	Years.	Years.	Years.	Years.	Years.	Years.
In North China	9	10	18	7	5	7
In Central China	8	9	16	6	4	6
In South China	7	7	14	5	3	5
Average for all China	8	9	16	6	4	6
COST.						
	Mexican dollars.	Mexican dollars.	Mexican dollars.	Mexican dollars.	Mexican dollars.	Mexican dollars.
Assumed cost of tie delivered	2.25	2.75	6.00	2.20	1.50	2.60
Cost of boring four holes for spikes .....	.04	.04	.04	.04	.04	.04
Cost of four track spikes .....	.13	.13	.13	.13	.13	.13
Cost of putting in track and spiking .....	.30	.30	.30	.30	.30	.30
Total cost of tie in track	2.68	3.22	6.47	2.63	1.93	3.03
Interest at 6 per cent per annum .....	.16	.19	.39	.16	.11½	.18
Total cost for life of tie	2.84	3.41	6.86	2.79	2.04½	3.21
Cost per year .....	.35½	.38	.43	.46½	.51	.53½
Equivalent initial cost compared to Japanese oak		2.51	4.95	1.68	1.02	1.7½

This shows that the present practice of using the Japanese ties is the most economical. One reason for the short life in South China is found in the ravages of white ants. The item of interest is figured on the assumption that the tie is paid for one year before being placed in the track.

The Germans used a very substantial pressed-steel tie in the construction of the Shantung Railway; it has given satisfactory results,

Special Agents Series No. 180.



FIG. 14.—STEEL TIES (SLEEPERS) OF BELGIAN MANUFACTURE ON THE CANTON-SAMSHUI RAILWAY.



FIG. 15.—STEEL TIES (SLEEPERS) ON THE FRENCH YUNNAN RAILWAY, INDO-CHINA LINES.

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Total cost of tie in track.....	2.68	3.22	6.47	2.63	1.93	3.03
Interest at 6 per cent per annum.....	.16	.19	.39	.16	.11½	.18
Total cost for life of tie.....	2.84	3.41	6.86	2.79	2.04½	3.21
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Equivalent initial cost compared to Japanese oak.....		2.51	4.95	1.68	1.02	1.7½

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The Germans used a very substantial pressed-steel tie in the construction of the Shantung Railway; it has given satisfactory results,

switch stand shown in figure 20 is in very general use on all the lines, although in some instances the lever throws parallel to the track instead of across as on this line, the Peking-Hankow. All the other materials coming under this account conform, in general, to the practice of the country furnishing the loan funds for the construction of the line. Figure 20 shows a typical construction of switch used on all the German, Belgian, and French lines. These are made from a heavy rolled form, which is planed down, making a very robust switch point; and it will be noticed that the installation is substantial with a heavy iron plate extending the entire length of the point. The frogs used are of the same general design. The British design of points and crossings is very similar to the American switch-and-frog practice. There is a growing tendency for all the lines to manufacture their own switches, frogs, and switch stands in their own workshops and, in doing so, to follow the general lines of the British practice. Figure 21 shows one of the various types of derailleurs; there is a very great variety of these, but in nearly all instances they might be called "home-made" devices.

RAIL ANCHORS.

Thus far very few anticreepers or rail anchors have been used on any of the Chinese Government Railways, but it is apparent at many places that their use would be very beneficial, although rock ballast in fairly liberal quantities has been used on many of the lines. The Shanghai-Nanking Railway has used some rail anchors with satisfactory results.

AMOUNT OF ROLLING STOCK.

One of the great needs of the Chinese Government Railways at present is a very considerable increase in freight cars and locomotives. On the Peking-Mukden Railway there has been an increase of 50 per cent in freight traffic in the last five years, with only a 22 per cent increase in freight cars and a 21 per cent increase in locomotives to handle this growing business. The following table shows a comparison of rolling stock:

Name of railway.	Miles of line.	Locomotives.		Passenger cars.		Freight cars.		Number of service cars.
		Number.	Per mile.	Number.	Per mile.	Number.	Per mile.	
Peking-Mukden.....	600	142	.....	332	.....	3,203	.....	38
Peking-Suiyuan.....	291	66	.....	93	.....	853	.....	8
Tientsin-Pukow.....	688	94	.....	223	.....	1,296	.....	123
Peking-Hankow.....	814	129	.....	187	.....	2,075	.....	41
Shanghai-Nanking and Shanghai-Hangchow-Ningpo.....	381	73	.....	218	.....	954	.....	18
Total.....	2,774	504	0.18	1,063	0.38	8,951	3.23	228
Imperial Government Railways of Japan (1916).....	5,757	2,680	.47	6,836	1.19	42,700	7.42	942
Germany (1913).....	38,154	29,520	.77	86,568	2.29	671,096	17.60
United States (1916).....	231,179	61,267	.26	104,290	.45	2,277,970	9.85	97,112

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FIGS. 17 AND 18.—TYPICAL EXAMPLES OF SIGNALING ON THE CHINESE GOVERNMENT RAILWAYS.



FIG. 19.—DEVICE USED ON THE PEKING-HANKOW RAILWAY IN AN ATTEMPT TO PREVENT CROSSTIES FROM CHECKING.

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FIG. 20.—TYPICAL SWITCH, SWITCH STAND, AND RAIL FASTENINGS ON THE PEKING-HANKOW RAILWAY.



FIG. 21.—DERAIL AND RAIL FASTENINGS ON THE PEKING-HANKOW RAILWAY.

From the above figures it will be noticed that these six lines, including the most important of the Chinese Government Railways, are provided with much less equipment per mile than the railways of Japan, Germany, or the United States, and the disparity becomes even more striking when the earnings are compared. This group of Chinese railways earned in 1916 \$19,700 (Mexican) per mile of line, against \$10,150 (gold) for the Japanese railways and \$15,600 for the railways of the United States. The earnings of the German railways for 1913 (the last year available) were \$22,300 (United States currency) per mile. With the prevailing price of silver, the earnings of the Chinese railways were actually higher than those of the Japanese railways and were practically equal to those of the railways of the United States.

Further attention will be called to this situation in the suggestions made later concerning the possibility of American interests furnishing rolling stock to these Chinese Government Railways, to be handled through an equipment-trust scheme similar to the arrangements by which many American railways have bought rolling stock in the past.

GENERAL CHARACTERISTICS OF ROLLING STOCK.

The initial equipment on all the lines (particularly those first constructed) is more representative of the practices of the nations furnishing the loan funds than is the case with the subjects already mentioned. As a result, the Chinese railways to-day have, as a whole, a more miscellaneous assortment of equipment than any other equal mileage of railways in the world. A considerable part of the rolling stock (particularly the locomotives and goods wagons first acquired) is light and of small carrying capacity. This was very unfortunate, for the reason that the railway business of China is not naturally a classified-goods business but rather the transportation of commodities, and this tendency, as the railways are extended and the traffic grows, will probably become more pronounced. Therefore, the advantage of freight cars of large capacity and heavy motive power, along the lines of American practice, is readily apparent. The character of the early rolling stock forms the explanation for the light design of the bridges, which will have to be corrected at much expense before the type of equipment demanded by this class of traffic can be used. The average tractive effort of all locomotives on the Chinese Government Railways is now approximately 21,000 pounds, the average carrying capacity of all passenger cars is 67.5 persons per car, and the average carrying capacity of all freight cars is 50,350 pounds. In connection with the locomotives, however, it should be mentioned that on the Peking-Suiyuan line, which is equipped with 60 American locomotives out of a total of 66, the average tractive effort of all locomotives is about 30,000 pounds, which has the effect of reducing the average of all locomotives on the other lines to about 18,700 pounds.

It is also surprising to find the small amount of freight equipment that is equipped with air brakes. In one instance this lack of power brakes is limiting the coal traffic that one of the roads can handle, during the winter when it should be handling the maximum tonnage. The Peking-Suiyuan line, on account of the heavy grades over the West Hills, is well equipped with air brakes on all its equipment, and

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the lack of brakes on the other lines is an additional restriction on the free interchange of traffic between this line and the other lines not so equipped. The Janney-Penn couple is used very generally on all the lines, and probably its use is more nearly universal than that of any other one device on the Chinese Government Railways.

LOCOMOTIVES.

The locomotives show, probably to a greater extent than any other feature, the tendency of each nation to follow its home practices in furnishing equipment for the Chinese railways. The result is that there are four distinct types of locomotive construction practice, British, Franco-Belgian, German, and American—the last named being present to a greater or less extent on all the lines and predominating on the Chinese-built lines, such as the Peking-Suiyuan and the Shanghai-Hangchow-Ningpo. Figure 22, facing page 96, shows a typical Franco-Belgian locomotive on the Peking-Hankow line. It illustrates the type of frame and truck construction, and also the elaborate pilot construction as contrasted with the typical bull-nose pilot of British practice. All locomotives except the American follow the plate or fabricated frame construction. The writer's conclusions, however, favored the American bar-frame construction, first, because this type of construction seems suited to the class of track construction and maintenance that will prevail, in general, on most Chinese railways; second, because of the advantage in shipping space, it being stated that there is a saving of more than one-third in this connection; third, because, when manufacturers are provided with adequate plant facilities, the American type gives the lowest first cost but not (as claimed by competitors) the lowest quality. The American engine is more serviceable for the operating requirements and repairing conditions in China, and the writer feels, therefore, that American manufacturers should make the most of this advantage and not accede to the demands of foreign engineers that the practice of their own particular countries be followed. There was one especially unfortunate instance of such ill-advised compliance, in which it was clearly the intention of the loan agreement to put the American practice on a parity with the plate frame specifications.

There are two other points that deserve special mention. The British engineers, as a rule, favor the Belpaire type of locomotive boiler fire boxes, claiming that with Chinese shop labor they can be more reliably inspected and cheaply maintained; and therefore, when this type of boiler is specified, there is no apparent reason why American manufacturers should not bid. As regards copper plates and brass boiler tubes, the writer feels that when these are specified quotations should be made accordingly, as this is largely a matter of price rather than of practice and, if necessary, an alternate price can be given for iron. On account of the distance from source of supplies, the smaller value of scrap, and the fact that the Chinese are very good brass workers but rather poor ironworkers, this point is one of very considerable weight in the above connection. Another point that probably has some bearing on this question is the long life that will probably prevail for all classes of rolling stock in China, on account of the large percentage of the first cost that is chargeable to shipping and the low cost of labor for the maintenance and operation of what might otherwise be considered obsolete equipment. It is

not believed that the type of frame construction affects this last consideration, but it is possible that, particularly in China, the copper and brass plates and tubes may have a bearing in this connection.

TRAIN BRAKES.

When used, air brakes are usually of the Westinghouse design of the nation furnishing the equipment. It is not usual for other nations to put as much braking on the locomotive and tenders as is the American practice. The passenger equipment, as a rule, is well equipped with air brakes, but no air train signals are in use on any of the lines. As already stated, the freight equipment is only partly equipped with air brakes. Most of the lines depend on hand brakes. As a rule, every fifth or sixth car is equipped with a small shelter; the train is arranged for two of these to come together, and the braking is done by hand.

PASSENGER EQUIPMENT.

Sleepers and first-class passenger cars are usually of the compartment-corridor type. The Peking-Mukden, Tientsin-Pukow, Peking-Hankow, and Shanghai-Nanking own and operate their own sleeping cars, and on all these lines the same equipment performs the service of first-class passenger car and sleeping car. These are the only lines running sleeping cars. These four lines and the Peking-Suiyuan own and operate their own dining cars. The second-class equipment is usually provided with serviceable wooden seats and the third-class sometimes with cheaper seats but frequently with benches; in some instances, particularly when the coolie class is carried, no seats of any kind are provided. Figure 24 shows the vestibules and one end of a diner on the Peking-Mukden Railway. It will be noticed that there are no steps to the vestibule platforms. This requires all station platforms to be built with only a low step from the vestibule. In no instance noted by the writer was any passenger equipment heated from the locomotive, the only hose connection being the one for airbrakes.

FREIGHT CARS.

The initial equipment on the first Chinese railways (except that purchased from America) was of small capacity, and much of it can best be termed goods wagons, but the tendency has steadily been toward equipment of greater capacity until to-day practically all new freight cars are of 67,200 pounds or 30 long tons capacity. All the Chinese railways use the British practice of a loading gauge. The size of equipment is somewhat restricted, and it would appear very desirable to increase this in the case of new railway construction, to permit of the utilization of larger equipment as the traffic develops—particularly if this development should be along commodity lines.

Figure 23 shows a freight-car truck (bogie) in general use on the Peking-Hankow line and somewhat similar in construction to the locomotive truck shown on the same page. Figure 26, facing page 116, shows a typical box car used on most of the Chinese railways. It was stated that this type of construction is quite satisfactory on all the lines north of the Yangtze River, but that the deterioration of the sheet iron on the southern lines, such as the Shanghai-Nanking, is

quite serious. With the scarcity of lumber in China, however, this design would seem to have much merit. The lower illustration on the same page shows a tank car of a type in general use by the Standard Oil Co. and the Asiatic Petroleum Co. for transporting refined kerosene. The one shown, as can be readily seen from the name, is used by the latter company.

CAR WHEELS.

The British have used their typical steel-tired wheel, usually with cast-steel centers and of 42 inches diameter, on passenger and freight cars of all classes and capacities. The Germans have done the same with a wheel 100 centimeters (39.37 inches) in diameter. On the American equipment, particularly freight cars, most of the wheels have been of the regular chilled cast-iron type and, according to the information obtainable, have given satisfactory results. One of the suggestions that the writer heard mentioned a number of times was the desirability of the Chinese Government Railways adopting such a standard size of car wheel as can be satisfactorily produced with a chilled cast-iron wheel and then making their own supply of wheels. This seems practicable when one takes into account the supply of iron ore and fuel, together with the fact that many of the Chinese shop laborers make good foundry molders.

SERVICE CARS.

On account of the large amount of cheap labor in all parts of China, very little attention has been given to labor-saving service cars, and the present equipment is almost entirely confined to that which involves the use of hand labor for all classes of work. One of the most generally seen pieces of special equipment is the small derrick car, sometimes taking the form of a small locomotive crane. Steam shovels and steam wrecking cars are practically never seen.

It seems proper to refer now to the history and special features of the several lines. The foregoing has been an effort to cover all the general characteristics, particularly the comparable features. The following is an effort to bring out the individual features of the different lines, but of necessity this can only be done very briefly, though many of the lines have very interesting histories that are beyond the scope of this report. So far as practicable, with the time available and the difficulties encountered, directories of the principal officials have been compiled and are being printed, all together, in an appendix, beginning on page 261.

PEKING-MUKDEN (CHING-FENG) RAILWAY.

LOCATION AND EXTENT.

This line connects Peking with Mukden, a distance of 524 miles. The Southwest Terminal is at the Chengyangmen Gate in the Chinese City of Peking. The Chengyangmen Gate is the most important entrance to the Tartar City and is within a short distance of the Legation Quarter. The Peking-Hankow main station at Peking is just south of this same gate and is only about a quarter of a mile from the Peking-Mukden main station. One end of the Peking-Suiyuan Railway's "around-the-city" branch terminates in the Peking-Mukden station and the other end at the Hsichihmen station,

which is the Peking-Suiyuan's main station just outside the northwest corner of the Tartar City of Peking.

At Fengtai connection is made with a branch of the Peking-Hankow Railway and with the East Terminal of the Peking-Suiyuan Railway. Connection is made with the Tientsin-Pukow at Tientsin and the South Manchuria Railway at Mukden. A very important branch leaves the main line a short distance south of Shanhaikwan and runs to the ice-free port of Chinwangtao, at which point the Kailan (also known as Kaiping) coal is handled to seagoing ships. Important branches extend from Kowpangtze to Yingkow or Newchwang and from Peking to Tungchow, the latter being practically Peking's port on one of the grand canals. There is also a short branch from Lienshan to the port of Hulutao in the extreme northwestern part of the Gulf of Liaotung, which is the northern part of what is usually known as the Gulf of Chihli. There are a number of spurs to coal mines of the Kailan Mining Administration operating the Kaiping coal field at Tongshan.

HISTORICAL SURVEY.

The history of this line has already been referred to at some length in connection with the Tangshan Colliery Tramway started in 1878, the name of which was changed in 1882 to the Kaiping Railway Co., with Wu Ting Fang as general manager, and again in 1887 to the China Railway Co., extensions being made during each interval. In 1891 the name of the Imperial Railways of North China was adopted, at which time the enterprise, to all intents and purposes, was taken over by the Imperial Chinese Railway Administration. At the opening of the Chino-Japanese war the line was completed from Tientsin to Shanhaikwan, with an extension beyond the latter point nearing completion. The outbreak of the Boxer uprising found the line extended to Machiapu, outside the Chinese City of Peking, and in the northeast the line had been completed to the neighborhood of Chinchow, with the construction well under way of the extensions to Hsinminting and Yingkow (Newchwang)—about 30 miles of the latter branch having been completed at the Yingkow end. During the occupation period following the Boxer uprising, the British in charge of the Peking section took advantage of the occasion and extended the line from Machiapu to the present Chengyangmen terminus in the Chinese City, as already mentioned, the line running just outside the south wall of the Tartar City for about two-thirds of the distance across this part of the city. At the same time the branch was built to Tungchow. These extensions were built without agreements of any kind and the Chinese accepted them without protest.

The Boxer uprising greatly delayed the completion of the Newchwang branch and the extension to Hsinminting, both of which were finally completed in 1903. The connection between Hsinminting and Mukden was first a narrow-gauge 3-foot 6-inch line built by the Japanese during the Russo-Japanese War, but by agreement between Japan and China this section was turned over to the Imperial Railway Administration of China in 1907, and the gauge was changed to 4 feet 8½ inches. Mr. C. W. Kinder was connected with the work from the beginning, until his retirement from the position of engineer in chief on April 1, 1909.

SOURCE OF CAPITAL.

The original capital used was in connection with the development of the Kaiping coal field and was largely Chinese, but with a considerable British interest and under British supervision. Money was later secured from various sources until the British loan for 16,000,000 taels was made in 1898, at which time the principal outstanding obligations were loans from the Hongkong & Shanghai Banking Corporation, totaling 1,240,000 taels, the Russo-Chinese (now Russo-Asiatic) Bank, 600,000 taels, and the Deutsch-Asiatische Bank, 700,000 taels—a total of 2,540,000 taels, all of which was refunded with the above loan.

As shown by the table on page 53, the total investment assets of the Peking-Mukden Railway December 31, 1916, amounted to \$60,467,577, against which there are outstanding obligations amounting to \$43,480,007—Chinese shareholders, \$26,142; Chinese Government, \$23,903,392; British-held bonds, \$19,320,000; and Japanese-held bonds, \$230,473. It will be noticed from this that there are investment assets of this property amounting to \$16,987,570 for which there are no outstanding securities.

PRESENT CONTROL.

While the provisions of the agreement of 1898 are still nominally in force and a British engineer in chief is in charge of the property, on account of the great margin of safety on this loan there have been concessions of considerable extent to the Chinese in the control and management of this system, particularly as to the releasing of the surplus funds to the Chinese Government for other uses. One such use has been the building of the Peking-Suiyuan line with the profits from the operation of the Peking-Mukden system. Thus far, however, the British have retained rather closely the prerogatives as to purchase of materials, equipment, and supplies.

CHARACTER OF TRAFFIC.

The operating receipts for 1916 amounted to \$14,542,518, of which 46 per cent was from passenger traffic and 54 per cent from freight business. Other revenues are not included in these figures but are included in the gross earnings shown in the table on page 57. Reference has already been made to the classes of passenger travel and the division of earnings in this connection. Sixty-four per cent of the tonnage carried and 42 per cent of the revenue for 1916 represented mineral products (largely coal), 10 per cent of the tonnage and 23 per cent of the revenue agricultural products, and 9 per cent of the tonnage and 17 per cent of the revenue manufactured products.

PRESENT PROFITS.

For the year ended December 31, 1916, the operating revenues of this system fell off \$468,207, but operating expenses were also reduced \$1,626,023, so there was a balance to net revenue from operations of \$8,856,148. The operating ratio was reduced from 49.61 per cent in 1915 to 40.32 per cent in 1916.

The operating ratio of this line has always been very low and the results profitable, and there is no doubt that, with proper manage-

ment, this will remain a very profitable railway property in the future.

At the present writing no extensions of this system are contemplated and, so far as can be predicted, none are likely to be undertaken, except short branches.

ROADWAY AND TRACK MATERIALS.

All construction and maintenance methods and materials are along the recognized lines of British practice. Practically all the bridges are permanent structures, and recently all structural requirements have been fabricated at the Shanhaikwan bridge works of the railway. The bridge over the Liao River about 40 miles from Mukden consists of twenty 100-foot spans, is one of the longest bridges in China, and was fabricated at the above-mentioned bridge works. The track is laid mostly with 85-pound rail and is generally well ballasted with broken stone. A number of places were noticed where rail anchors could have been used to much advantage to prevent rail movement, but apparently little had been done toward anchoring the rail. All track is laid with square joints, in accordance with the general British and Continental practice.

ROLLING STOCK.

For some years past most of the rolling stock for this line, with the exception of a few American locomotives recently purchased, has been erected at the Tangshan shops. Most of this rolling stock conforms, in general, to British practice, and the materials used are largely from British sources. A certain amount of this equipment has been built along the special lines followed in China, but there is a growing tendency toward the use of freight cars of larger capacity, and most of the recent equipment has been built with four-wheel trucks (bogies). Figures 26 and 27 show some of the equipment built at these works in recent years.

The average tractive capacity of the Peking-Mukden passenger-service locomotives is approximately 20,000 pounds and that of the freight locomotives about 31,000 pounds. The average capacity of passenger cars is about 65 people per car and the average capacity of freight cars about 47,500 pounds per car. Nearly all freight cars built in recent years have been of 66,800 pounds capacity, or 30 long tons, and very few four-wheel wagons have been built for some years.

WORKSHOPS.

The principal workshops are those at Tangshan, which have already been mentioned a number of times. These shops are well arranged and fairly well equipped and are in close proximity to the Kaiping coal field, assuring a cheap and reliable supply of fuel. These works are not only capable of handling all classes of repairs to the rolling stock of this system but have in the past built a considerable part of the rolling stock, particularly passenger and freight cars, as well as some locomotives for the other Chinese Government railways, such as the Peking-Suiyuan and Kirin-Changchun lines. In connection with the administration of the shops there is a small number of Europeans, all of whom are British, but not enough by any means to take care of all the details of management. A con-

siderable number of Chinese are employed in administrative and technical positions, and all power-plant engineers, cranimen, electricians, and other special employees of similar character are Chinese. This is in contrast with the Shakako workshops of the South Manchuria Railways at Dairen, where all such positions are filled by Japanese. These latter works will be specially referred to later in connection with the South Manchuria Railway Co.

Common day labor at the Tangshan shops is paid \$0.30 Mex. Experienced shop artisans are paid from \$0.70 or \$0.80 up to \$1 Mex., and workmen such as the best boilermakers are paid as high as \$1.30 Mex. Employees called "No. 2 men," who are really foremen of their respective sections, are paid \$54 Mex. per month. These men are next to the general foremen of shops, who are either foreigners or educated Chinese whose salaries come under regulations established by the Ministry of Communications.

TANGSHAN RAILWAY AND MINING COLLEGE.

Education of Chinese for administrative and technical positions in railway service was first undertaken at Shanhaikwan. In 1907 arrangements were made with the Chinese Engineering & Mining Co., now the Kailan Mining Administration, and the Tangshan Railway and Mining College was established for the education of Chinese railway and mining engineers. The present buildings take care of about 160 students, including boarding accommodations; very comfortable residences are provided for the president of the college and the members of the faculty, of whom at present two are British and two American. The establishment of this institution was due largely to the foresight of the late president of the Chinese Republic, Yuan Shih Kai, who at that time was Viceroy of the Province of Chihli.

ORGANIZATION AND PERSONNEL.

The promulgated organization of this line has already been given in detail on page 65. The foreign staff on this railway is entirely British, and the agreement of 1898 is still in force, providing that the engineer in chief and the chief of accountants shall be British subjects. As a result, the technical foreign staff has always been almost entirely British.

A directory of the principal officials in the Peking-Mukden organization is given on page 261. There are also given the names of the London agents and the consulting and inspecting engineer with offices in London.

PURCHASE OF STORES.

The purchase of all classes of stores is done by the stores superintendent under the direction of the engineer in chief. The stores superintendent and the general stores depot are located at Hsinho, about 25 miles from Tientsin and near the Taku anchorage, which is the point where ocean vessels discharge much cargo instead of going up the Pei-ho to Tientsin. The policy of this line in normal times is to purchase imported supplies so far as practicable from British sources.

PEKING-SUIYUAN (KIN-SUI) RAILWAY.

LOCATION AND EXTENT.

This line connects with the Peking-Mukden and Peking-Hankow Railway at Fengtai, runs along the west wall of the Chinese and Tartar Cities of Peking and then extends in a northwesterly direction to Nankow, over the West Hills, via Nankow Pass, to Kalgan, thence to Tatung and to the present western terminus, Fengchen, 266 miles from Fengtai. The Mentowkow branch leaves the main line at Hsichihmen station at the northwest corner of the city of Peking, reaching important coal deposits 16 miles distant, in a westerly direction. There is also what is called the "Round Peking City Branch," connecting with the main line at this last-named station and running along the north, east, and south walls of the Tartar City and going into the Chengyangmen station of the Peking-Mukden Railway.

Kalgan, after Peking, is the most important point on this line. Kalgan is the present terminus of the caravan travel from Mongolia and in many ways is one of the most interesting places of trade in China. For an inland town the population is very mixed, and the number of articles traded in is very varied, including hides, furs, wool, camel's hair, and similar commodities.

This line, in crossing the West Hills, rises on a 3½ per cent grade, or, as it is usually expressed in this part of the world, a grade of 1 in 30. As already mentioned, this part of the line is through rough mountain country. The remainder is through fairly easy or moderately rough country, from the standpoint of railway construction.

HISTORICAL SURVEY.

This line has been built entirely by Chinese engineers and with funds controlled by the Chinese Government. The construction was started in October, 1905, and was completed to the following places in the order and dates shown: To Nankow in September, 1906; to Kalgan in September, 1909; to Tunchun in June, 1911; to Changsui in April, 1912; to Tatungfu in April, 1915; and to Fengchen, the present terminus, in September, 1915.

Dr. Jeme Tien-Yow¹, who graduated from Yale in 1881 and has since become the most prominent Chinese civil engineer (being now the director general of the Hukuang Railways) was chief engineer during the construction to Kalgan. Mr. K. Y. Kwong, who graduated from Massachusetts Institute of Technology in 1881 and is now chief engineer of the North Section of the Tientsin-Pukow Railway, was chief engineer during the construction to Fengchen.

The Chinese have good reason to be proud of the building and operation of this railway, which is well located, is substantially built, and has been successfully operated from the standpoint both of service furnished and of financial returns on the cost of construction. The historical statement with regard to these lines in the 1915 annual report seems of sufficient interest to warrant the quoting of the following parts, which are literal translations from the Chinese text:

PEKING-KALGAN SECTION.

In the fourth moon, thirty-first year of Kwangsu (1905), His Excellency Yuan Shi-Kai, and His Excellency Wu Chu-Fan, the then directors-general, memorialized

¹ EDITOR'S NOTE.—The death of Dr. Jeme has recently been reported.

the Throne for authority to construct this line with purely Chinese funds, and the construction work was also to be undertaken entirely by Chinese officers, without engaging any foreign experts. Consequently Dr. Jeme Tien-Yow was specially deputed as the engineer in chief to conduct the said construction solely.

The work was commenced on the ninth moon of the thirty-first year of Kwangsu (1905), and the entire line was completed on the eighth moon of the first year of Hsuan Tung, a period of four years.

This was the first railway that was built by purely Chinese officers, and it was greatly admired by both European and American tourists. The distance of this line was 357 li (122 miles), or 449 li, if sidings are included. The whole undertaking cost 7,085,000 taels or thereabouts. The funds for the construction of the Peking-Kalgan line were appropriated yearly out of the surplus earnings of the Peking-Mukden line, after deduction of the payments of the six months' interest and capital for the loan.

KALGAN-SUIYUAN SECTION.

As the Peking-Kalgan Railway was nearing completion, the Board of Communications was meditating the extension of this line from Kalgan to Urga (Kulun) or to Suiyuancheng. But, considering the scarcity of goods between Kalgan and Urga, it was thought more convenient to extend the line to Kweihsia and Suiyuancheng. Moreover, from the standpoint of business importance, if extensions were made from Kalgan to Tatung, Fengchen, Kweihsia, and Hokow, which are all busy commercial centers, locally, we should be able to obtain the advantage of easy transportation of coal and foodstuffs from Tatung and Yangkow; afar, we also would have the chance to collect the furs and livestock of Urga and Ninghsia. Furthermore, in the future passengers as well as goods from the west and north might be "gathered together like clouds." Hence, huge profits for the railway might reasonably be expected. The extension work of this line was approved by Imperial sanction in the seventh moon of the first year of Hsuan Tung (1909). The construction began on the third moon of the second year of Hsuan Tung (1910). The length of the line was 689 li (235 miles), and the estimated cost of the construction work was 16,060,000 taels, or approximately that. The funds for the construction of this line were similarly appropriated by installments out of the surplus earnings of the Peking-Mukden Railway, and the remainder was to be made up out of the earnings of the Peking-Kalgan Railway.

The extension of the Changsui Railway was approved by the Imperial Government, under the amalgamated management of the officers of the Peking-Kalgan Railway, with the temporary name of "Changsui Extension," without having a separate administration for this line, in order to prevent unnecessary expenditure.

PEKING-MENTOWKOW BRANCH LINE.

In the western hills of the capital the coal products were so rich that hitherto people and merchants of this locality have relied upon the coal as their means of livelihood.

As transportation of coal depended solely upon camels, the freight on coal was high and its consumption limited. Consequently the merchants jointly petitioned the Board of Trade that shares should be subscribed by merchants for constructing this branch line with a view to developing the coal trade. But the Ministers of the Board of Trade were afraid that if the capital were subscribed by merchants, bad results might ensue as a result of mismanagement, since this was an important location near the Imperial Capital.

Therefore this kind of branch line should be constructed out of Government funds. At length Imperial sanction was obtained to have the construction of this branch line carried out simultaneously with that of the Peking-Kalgan Railway, the length of this branch line being 40 odd li (16 miles), and the cost of its construction being more than 561,000 taels.

ROUND-CITY BRANCH LINE.

The main line of this railway originates from Fengtai, passing Kwanganmen and Hsichihmen of the capital in a northerly direction. The inhabitants living near these localities enjoy the privilege of traveling by train, while those from the various places in the eastern and northern parts of the city are still experiencing great inconvenience in traveling by rickshaws, mule carts, and carriages. In the third year of the Republic of China (1914) the Ministry of Communications, in order to improve transportation facilities in the metropolitan municipality, petitioned the Government for authority to construct a round-city branch line, proposing that the construction work and the raising of funds be undertaken by the Peking-Kalgan Railway. The petition was approved in a mandate issued on the 28th day of May of the same year.

Accordingly the line was surveyed and estimates and plans were prepared; but the construction work was temporarily postponed for want of funds.

In March of this year this administration received, through the Ministry of Communications, instructions from the State Department as to the necessity of having a branch line from Hsichihmen to Chengyangmen constructed at the earliest possible date. Consequently the work was begun on the 16th day of June and the time fixed for its connection with the Tungchow Junction of the Peking-Mukden line at Tungchihmen, and thence to Chengyangmen, was six months. This line passes en route the four gates, namely, Teshingmen, Antingmen, Tungchihmen, and Chaoyangmen, covering 23 li (7 miles). The cost of construction was estimated at 441,000 odd dollars.

SOURCE OF CAPITAL.

As already stated, this line has been built entirely with Chinese-controlled funds and mostly from surplus earnings of the Peking-Mukden Railway. In two instances short-time loans were made, but these were paid out of 1914 earnings, and during the latter part of 1917 a one-year loan for \$1,000,000 was floated in China. In the summer of 1918 a new short-time loan was advertised, being for \$4,000,000 at 7½ per cent, repayable by annual drawings of \$1,000,000 each year to 1922, inclusive.

PRESENT CONTROL.

The present control is entirely in the hands of the Chinese Government.

CLASS OF TRAFFIC.

Revenue from freight on this line constitutes about 75 per cent of the earnings, leaving 25 per cent for passenger business. This is the largest proportion of earnings from goods business on any of the lines of the Chinese Government Railways. The preponderance of tonnage is toward Peking and the Fengtai connection with the Peking-Mukden and Peking-Hankow railways, this giving the advantage of a down-grade haul over the West Hills. Agricultural and pastoral products constitute the largest part of the business.

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

Since the completion of this line to Kalgan it has shown a satisfactory profit, and will no doubt continue to do so in the future, particularly if branches are built as contemplated and the growing of additional special products along the line is developed, such as is now the case with the potato crop raised between Hsuanhuafu and Kalgan. The earnings and expenses for the Peking-Kalgan section have been as follows:

Items.	1913	1914	1915
Earnings.....	<i>Mex. dolls.</i> 2,865,400	<i>Mex. dolls.</i> 3,755,000	<i>Mex. dolls.</i> 2,721,500
Expenses.....	1,298,025	3,114,000	2,052,700
Profits.....	1,567,375	641,000	668,800

EXTENSIONS.

As stated above, two short-time loans were included in the 1914 expenses. The continuation of the line is already under construction

from the present terminus at Fengchen to Suiyuan, which is a considerable caravan center. Although it is somewhat smaller than Kalgan and not so important at present, it is quite probable that, on account of its being farther in the interior, Suiyuan may in time attain equal or greater importance. This, of course, would be of advantage to the railway because of the longer haul and the down grade. It is also probable that other branches will be built in the future, particularly in a southwesterly direction from Tatung, but on account of the development of caravan travel it would seem wise to make the extension slowly, for the reason that a relatively small railway mileage will probably serve this part of China adequately for a good many years to come. This viewpoint, of course, does not take into account military or political considerations, which are entirely outside the scope of this report.

ROADWAY AND TRACK MATERIALS.

The bridges for this line were largely fabricated at the Shanhaikwan bridge works of the Peking-Mukden Railway. The rail and joint material came largely from the Han-Yeh-Ping steel works at Hankow. The weight of all rail is 85 pounds to the yard. The Sandberg section was used at first, but for some years the standard Chinese section shown on page 75 has been used instead. A good many of the requirements, such as switch stands, have been purchased in America from time to time.

ROLLING STOCK.

The greater number of locomotives on this line are of American manufacture. As already stated, the average tractive capacity of all locomotives on the Peking-Suiyuan Railway is about 50 per cent greater than the average on the other lines of the Chinese Government Railways. The passenger locomotives for this line average about 30,000 pounds, the freight locomotives about 35,500 pounds, and the switching (shunting) locomotives about 15,750 pounds. On the Peking-Kalgan section the passenger locomotives are about 34,700 pounds, and the average of the freight locomotives is about 35,800 pounds, though some of the latter run to more than 70,000 pounds. The Chinese are quite proud of the fact that the heaviest locomotives in use in the Far East are the Mallet-type engines in service on the Nankow grade, built by the American Locomotive Co. There are also in use on this same grade six Shay geared locomotives, but by experience it has been found that tractive engines will do the work satisfactorily under all weather conditions.

Most of the passenger and freight car equipment of this line was built at the Tongshan shops of the Peking-Mukden Railway, although a relatively small amount is of American manufacture.

WORKSHOPS.

The principal workshops are located at Nankow, but there are also shops of considerable importance at Kalgan. With the extensions to this system and the necessary amount of additional equipment on account of the growing traffic, these shops are not sufficiently equipped with shop machinery and power to handle the work to the best advantage and with sufficient expedition. There are apt to be delays in the shops, involving equipment that is needed for handling the traffic

Additional machine tools, with required power, are needed, and a system of compressed air with air-working tools would be a great asset in putting the boilers of the large locomotives through the shops more quickly than with the present hand-working methods.

ORGANIZATION AND PERSONNEL.

The nominal organization of this line, because of there being no foreign contract employees, conforms rather closely to the regulations promulgated by the Ministry of Communications. During the last few years, however, there have been several changes in the position of managing director of this line, as well as a considerable number of changes in both the organization and the personnel. In other respects, very capable engineering and management have prevailed on this railway both during its construction and in the course of its maintenance and operation.

On page 262, following the Peking-Mukden directory, there is a list, with addresses, of the present principal officials of this line.

PURCHASE OF STORES.

The general stores depot is located at Nankow, about 25 miles from Peking. Under the supervision of the managing director the purchase of stores is handled by a superintendent of stores whose office is in the general stores depot at Nankow. In the purchase of stores for this line preference is given to Chinese products, but in the case of requirements that need to be imported this railway has always been very favorably inclined toward the purchase of American goods.

TIENTSIN-PUKOW (TSIN-PU) RAILWAY.

LOCATION AND EXTENT.

This is a north-and-south line. The north end at Tientsin connects with the Peking-Mukden line. The south end terminates at Pukow, across the Yangtze River from Nanking, at which point ferry connection is made with the Shanghai-Nanking line. This line north of the Yangtze River serves practically the same territory as the Grand Canal constructed by the Mongol Emperor, Kublai Khan, more than 500 years ago, which provided an inland waterway from Hangchow to Peking. This canal was used for transporting to the imperial court at Peking the grains, silks, and other products from the rich Provinces of Southeast China. The distance from the central station at Tientsin (where connection is made with the Peking-Mukden Railway) to Pukow is 627 miles. In addition, there are branches to mines and canals amounting, in all, to about 60 miles. At Tsinanfu connection is made with the Shantung ("Santo," Japanese name) Railway, and at Hsuechowfu connection is made with the Pienlo system.

HISTORICAL SURVEY.

The original concession was for a railway from Tientsin to Chin-kiang and was granted to a Chinese named Yung Wing, with permission to raise funds by foreign loans. Later, when it was concluded to build the Shanghai-Nanking Railway, the southern terminus of this line was changed to Pukow, which is directly across the Yangtze River from the Shanghai-Nanking terminal. Yung undertook to

raise the necessary capital in England and America, but when Germany seized Kiaochow the Kaiser's Government demanded preferential rights for all railway concessions in the Province of Shantung and the contract that Yung had made for \$27,500,000 gold had to be canceled on account of German objections. During the "Battle of Concessions" Germany agreed to confine its railway activities to Shantung and the Hwang Ho (Yellow River) Valley and England to the Yangtze Valley, and a working agreement was reached that Germany should finance and construct the northern section of the Tientsin-Pukow line, from Tientsin to the southern boundary of Shantung, a distance of 390.5 miles, and that England should finance and construct the southern section from the above boundary to Pukow, a distance of 236.5 miles. This arrangement has been continued up to the present time in the maintenance and operation of the line, though there is apparently no reason why one organization should not handle the situation economically and satisfactorily in every way.

The preliminary agreement was not finally negotiated until May, 1899; before the final agreement was concluded the Boxer uprising occurred and negotiations were suspended until 1902; the final agreement, as shown by appendix 6, was not formally signed until January, 1908. The conditions of this loan are known as the "Tientsin-Pukow Terms."

SOURCE OF CAPITAL.

As already stated, the loan funds were furnished in accordance with the Anglo-German agreement of January, 1908. The general balance sheet for December 31, 1916, shows the investment assets as amounting to \$99,803,208, against which there are outstanding capital liabilities totaling \$98,839,324, divided as follows: Permanent Government (Chinese) investments, \$3,589,350; mortgage bonds, \$84,526,884; other secured indebtedness, \$10,723,090.

The obligations other than the permanent Government investments are divided as follows: Deutsch-Asiatische Bank, Shanghai branch, \$61,391,364; Chinese Central Railways (Ltd.), London (the banking connection of which is the Hongkong & Shanghai Banking Corporation), \$33,858,610. It is assumed in connection with the table on page 42 that all the securities are of ownership other than Chinese, but the writer was unable to ascertain the facts regarding the details of this ownership.

PRESENT CONTROL.

After the completion of construction the management was not consolidated as was apparently the intention of the loan agreement, but, with one Chinese managing director for the entire line, the foreign staffs were retained for the two sections. This arrangement continued until China severed relations with Germany in 1917, when the German staff on the northern section was dismissed and replaced by Chinese, except in one instance, in which a British boiler inspector was appointed at the Tsinanfu workshops. The British staff is still employed in the maintenance and operation of the southern section.

CLASS OF TRAFFIC.

For the year ended December 31, 1916, earnings from passenger service amounted to \$4,457,837 Mex. and the freight business to

\$5,323,963 Mex. Roughly, therefore, the passenger earnings were 45 per cent and the freight 55 per cent. The business of this railway is probably quite typical of that to be expected on a new line, and the probability is that there will be a constantly increasing traffic in mineral products, as has happened on the Peking-Mukden and also, to a noticeable extent, on the Peking-Hankow line.

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

The result of operations in 1913 was a deficit of approximately \$1,965,000 Mex. It was impossible to secure reliable figures on the 1914 earnings. The results of operations for the years 1915 and 1916 are shown by the table on page 57. A total accumulated deficit of \$5,793,877 was left at the end of the year 1916.

The very disastrous floods along the north end of this line during the last four months of 1917 may have reduced the profits for that year, but this condition will be only temporary and there are good grounds for thinking that this line will be reasonably profitable in the future. The following is an excerpt from the annual report for 1916:

In goods traffic a considerable increase in transportation of agricultural products is to be noted, and still better results could have been realized but for the shortage of locomotives and goods wagons, owing to which a great deal of cargo could not be carried and was often diverted to the old routes by canal or road. To overcome this difficulty in some way, arrangements were made with the Lunghai (Pienlo) Railway and the Chung Hsing Mining Co. for the hire of cars, and 50 (30-ton) covered cars were ordered from America; but the latter did not arrive even up to the end of the year, owing to the shortage of freight steamers from that country to China.

This statement is typical of the conditions existing on practically all the Chinese Government Railways, and, in connection with the statement on page 77, is in support of the suggestions and recommendations made later regarding an arrangement for these railways to purchase equipment by means of equipment trust certificates.

EXTENSIONS.

At present no extensions are contemplated. In fact, it came to the notice of the writer, in the case of the development of a coal mine requiring a branch of some 20 miles, that the coal company was evidently told that it would have to build the branch and, in addition, furnish 100 coal cars as its share of the necessary equipment, for the reason that the railway at present was not in a position to build this branch or buy the additional equipment. It would appear, however, from a study of the map of this part of China and the railways suggested for this territory, that the natural and economical arrangement would be to construct and later maintain and operate these additional lines in connection with the Tientsin-Pukow line. It would seem also that when the Shantung Railway is turned over to China it should be operated in connection with this system of railways.

ROADWAY AND TRACK MATERIALS.

The roadway of this line is very substantially built and all structures are permanent. On the German section all materials were purchased in Germany, including a large amount of rail for the first section constructed, although it was clearly the intention that this

should be furnished from the Han-Yeh-Ping plant, as was the case on the Southern or British section; what was ordered later from these works was a special German section of 67.3 pounds to the yard. On the southern section anything that could be purchased in China was bought there and all other materials and equipment were opened to competition, with the result that the contracts were placed with British, Continental, and American concerns and China secured these railway requirements at better prices than in any previous instance. A considerable part of this line's maintenance requirements, such as switch stands, frogs, and switches, are being manufactured in the workshops at Tsinanfu and Pukow, although in connection with the requirements for the German section there is such a large stock on hand that many of the materials will last for a great number of years—in fact, in some instances they may never be used.

ROLLING STOCK.

On the German section all the rolling stock was purchased in Germany, and it is claimed, with very good reasons to support the belief, that much of this equipment was actually on the way to China before the invitations for tenders were published in Tientsin to comply with the terms of the loan agreement. On the British section tenders were invited for all the equipment, with the result that considerable portions of this came from countries other than the United Kingdom. Half of the first 200 freight cars came from Belgium, 2 of the first 10 locomotives from America, all the rail and fastenings from the Han-Yeh-Ping iron works, and most of the cement from the Hankow plant of the Chee Hsing Co., which also has a plant at Tangshan. This line is in need of additional rolling stock, as is indicated by the quotation on page 91 from the 1916 annual report. During the early part of 1917 the Pressed Steel Car Co. furnished the line 50 very excellent covered cars somewhat similar to the one shown in figure 26.

WORKSHOPS.

There are very well arranged and equipped workshops on both sections, involving unwarranted expense for the construction, maintenance, operation, and overhead expense of two complete general workshops when one such shop as that at Tsinanfu would have been entirely adequate. The shops on the German section are located at Tsinanfu and are equipped entirely with German shop machinery. This shop, with its present facilities and by utilizing part of those now installed at Puchen, would be capable of taking care of the general repairs of all rolling stock for the entire Tientsin-Pukow line and also the Shantung Railway, running from Tsinanfu to Tsingtau. The shops on the British section are located at Puchen, about 10 miles from the Pukow terminal. These shops are not so extensive or so completely equipped as those at Tsinanfu. The shop machinery has been purchased on the open market like the other requirements, but most of it is of British manufacture.

ORGANIZATION AND PERSONNEL.

Under date of October 20, 1916, regulations for an organization similar to that of the Pekin-Mukden were promulgated, but, as

already explained, while the administration is under one managing director for the entire line, with a limited number of general officers, there are in addition the district staffs, retained on each of the construction sections, which are now termed the Tsinhan District for the north or German section and the Hanpu District for the south or British section. A list of the principal officers for the general office and each district is given in the directory beginning on page 262.

PURCHASE OF STORES.

The purchase and supervision of stores come under a subdepartment of the general department, and the official in charge is the secretary and general storekeeper, whose office is at Tientsin. In addition, there are district storekeepers at Tsinanfu and Pukow. The district storekeeper at Tsinanfu, since the Germans were dismissed, is a Chinese and comes under the usual regulations for the Chinese Government Railways, but the district storekeeper at Pukow is under the general jurisdiction of the engineer-in-chief of the Hanpu District. It is now the general practice of this line to invite tenders by advertisements, such as the one shown on page 68. This line recently lost considerable stretches of its roadway at the northern end of the Tsinhan District, and the permanent repairs will probably require some additional bridge materials to replace the lost bridges or to provide additional openings.

PEKING-HANKOW (KIN-HAN) RAILWAY.

LOCATION AND EXTENT.

The northern terminus of this line is south of the Chengyangmen gate in Peking, as mentioned in connection with the Peking-Mukden Railway. The total length of the main line is about 750 miles and the southern terminus is Hankow on the Yangtze River, which is in about the same latitude as New Orleans. Hankow is about the same distance south and west of Peking as New Orleans is of Indianapolis. This at present is the longest journey that can be made on the Chinese Government Railways without change of cars. There are five branches, mostly to coal mines, with a total of about 60 miles of line, the longest of these branches being 26 miles.

HISTORICAL SURVEY.

Because of diplomatic and other considerations, it is rather difficult to include the salient features of the history of this line in a report of this kind. This was one of the earliest railway projects considered in China and was the first instance in which China formally invited the cooperation of foreign capital. The first step leading up to the construction of the present line was the organization in 1896 by Chang Chih-tung, viceroy of Hukuang, of the Chinese Railway Co., a Chinese Government organization with an authorized capital of 30,000,000 taels, of which, however, the Chinese were able to raise only 13,000,000 taels, after which the assistance of foreign capital was invited.

The first parties interested were an American syndicate represented by Senator Washburne, for whom surveys and estimates were made by Capt. Rich, and one of whose assistants was Mr. K. S. Low, already men-

tioned as managing director of the southern section of the Tientsin-Pukow line. For some time in 1897 it looked as though the construction of this line would go to this American syndicate, although at the same time there were in progress negotiations by British interests. During this interval Mr. Sheng Kung-Pao was made director general of the company; he took an active part in carrying the project to a conclusion and continued his activities in the railway situation up to his dismissal in 1911. During the time these surveys were being made and negotiations were in progress, a Belgian syndicate named the *Société Financière et Industrielle Belge en Chine* entered the field without attracting serious attention and concluded the preliminary agreements of 1897, as shown by the documents in appendix 3. This syndicate, as developments have since clearly shown, was a Franco-Belgian combination operating with Russian assistance and interest. As quickly developed, the financiers of these interested nations could not obtain the necessary funds under the terms of the preliminary contract, with the result that resort was had to a series of concessions secured through extended negotiations (supported by diplomatic pressure from Russia, France, and Belgium) and resulting in the final agreement under which the line was constructed by *La Société d'Etude des Chemins de Fer en Chine*. The concluding of these negotiations was the particular event that precipitated one of the acute periods of the "Battle for Concessions."

The supplementary loan of 1905, as shown by appendix 3, provided the necessary funds for the final completion of the railway.

In 1907 the net profits amounted to approximately \$2,000,000 Mexican, and the Chinese concluded that the line was going to be very profitable, as it has since proved to be; but as the Belgian syndicate was entitled to 20 per cent of the annual profits, it was decided to pay the 5 per cent premium and redeem the original loan. This was successfully accomplished in 1908 by the flotation of the present Anglo-French loan for £5,000,000. The line was taken over by the Chinese Government on January 1, 1909, and has since been operated by the Ministry of Communications under the terms of this loan agreement.

SOURCE OF CAPITAL.

The original loan, finally aggregating about £4,500,000, is said to have been distributed about three-fifths to French subscribers and two-fifths to Belgian. The writer was able to obtain no reliable information as to the division between British and French subscribers of the present Anglo-French loan of £5,000,000. Special attention is called to the table on page 54 as showing that the Chinese Government, through the ownership of the permanent investments and the additions from surplus, now actually owns about 50 per cent of the capital cost of this system.

PRESENT CONTROL.

Notwithstanding the fact that the present loan has eliminated the concession features, a considerable French technical staff is retained in the maintenance and operation of the property and all statistical and technical information is printed in French or Chinese.

This French staff appears to have a very considerable authority in the administration of the property.

CLASS OF TRAFFIC.

The traffic on this line may be roughly divided into 30 per cent passenger and 70 per cent freight. Mineral products, of which a large part is coal, represent more than 40 per cent of this traffic, agricultural products more than 15 per cent and manufactured products less than 15 per cent. The Cheng-Tai and Taokow-Chinghua lines both turn over to this line a considerable amount of coal, and this will probably increase from year to year. This line and the Canton-Hankow Railway (when the latter is completed) will constitute the principal north-and-south trunk line from the populous center of Canton through a densely settled country to the coming industrial center of Hankow and then to the city of Peking.

PRESENT PROFITS.

In 1912 this line earned \$5,246,300 net; in 1913 it earned \$7,548,600 net; in 1915, after all fixed charges and taxes, net earnings were \$6,069,572; and for 1916 they rose to \$8,751,912. The net earnings for 1917, however, were adversely affected by the very disastrous floods over the greater part of this territory, which destroyed considerable stretches of railway and a number of expensive bridges. This, however, will be only a temporary effect, and there is no doubt that this line will continue to be profitable and will in time liquidate its entire indebtedness out of earnings.

At present no extensions are contemplated other than those in connection with the development of mines (generally coal) in the territory along the line.

ROADWAY AND TRACK MATERIALS.

Practically all of the rail and fastenings come from the Han-Yeh-Ping works. The rail weighs 76 pounds per yard and is a Belgian section. All switches, frogs, signals, and other similar materials were furnished from Belgium or France, except in a very limited number of instances when these could be purchased from Chinese manufacturers. There is a very considerable number of bridges on this line, the longest being the one over the Yellow River, which is 9,875 feet in length, about 11 feet above high water, partly through trusses and partly deck girder construction, all supported on very elaborately placed screw piling. One-half of the superstructure was fabricated in Belgium and the other half in France, and the floor system is all of the stringer type, with the openings filled in with metal plates, as already mentioned. This structure and all the other bridges on this line have been much criticized as not being of sufficient strength to carry properly the motive power that is being used. It was stated that the permissible loading is very little, if any, in excess of Cooper E-35, and the appearance of the structures would seem to warrant this statement. The advertisement reproduced on page 67 was for tenders to replace some of the bridges lost during the destructive floods along a considerable length of this line in 1917. It is reported that most of this business was awarded to an American concern.

ROLLING STOCK.

The rolling stock is all of Belgian or French manufacture. It is illustrated in figures 22 and 23. This line, as is the case with the other Chinese Government Railways, is short of freight-car equipment for handling all the business offered.

WORKSHOPS.

There are three workshops on this line, the largest and most important being at Changhsintien, about 32 miles from Peking. The Chingchow shops are district repair shops about 430 miles from Peking, and the Hankow district repair shops are only a few miles from that end of the line. None of these shops are laid out on the lines of the Tongshan or Tsinanfu shops, and in the course of time they will no doubt need considerable additional shop machinery. The present shop equipment is quite varied, and a considerable number of the machine tools are of American manufacture.

ORGANIZATION AND PERSONNEL.

The organization for this line is very similar to that shown for the Peking-Mukden and was promulgated the same date, October 20, 1916. In the directory given on page 263 the writer was not entirely able to reconcile the titles with the requirements of the promulgated organization.

PURCHASE OF STORES.

The administration and purchase of stores come under a sub-department of the general department, but the present managing director, Mr. C. C. Wang (Chinese), gives all important purchases his personal attention. In purchasing all supplies by public tender, this railway has probably taken steps in advance of any of the other Chinese Government Railways. The Peking-Hankow is the only line that has so far made any move toward the purchase of miscellaneous merchandise requirements by the arrangement of annual contracts.

CHENG-TAI (SHANSI) RAILWAY.**LOCATION AND EXTENT.**

This is the only meter-gauge line of the Chinese Government Railways and connects with the Peking-Hankow at Shihchiachuang, about 172 miles south of Peking. The line extends westward 151 miles through a very rough country to Taiyuanfu, the capital of the Province of Shansi, which is about 2,600 feet above sea level. The highest point on the line is about 3,500 feet in altitude. There are 21 tunnels on the line, but the longest is only about 960 feet in length. There is also a large number of bridges and viaducts, some of them of very considerable size.

HISTORICAL SURVEY.

The first reconnaissance and estimates for this loan were made by a French engineer for the Russo-Chinese Bank and the Comptoir d'Escompte in 1897. In May, 1898, the Russo-Chinese Bank made a preliminary agreement with the Chinese Government to furnish 25,000,000 francs for the construction of this line, but after resurvey

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FIG. 22.—LOCOMOTIVE ON THE PEKING-HANKOW RAILWAY.



FIG. 23.—FREIGHT-CAR TRUCK ON THE PEKING-HANKOW RAILWAY.

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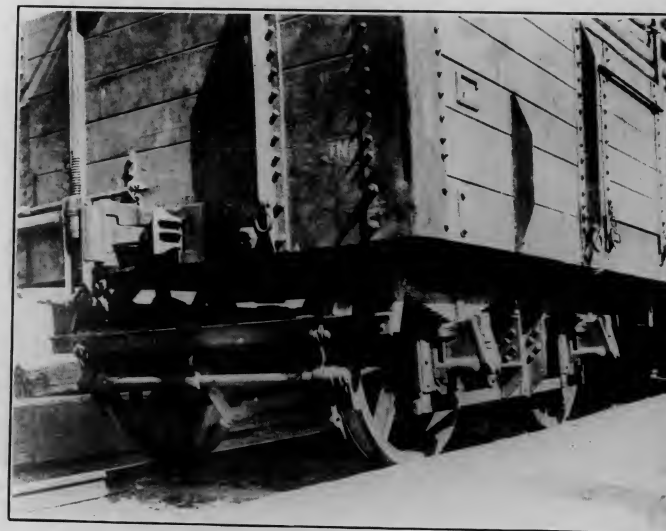


FIG. 23.—FREIGHT-CAR TRUCK ON THE PEKING-HANKOW RAILWAY.



FIG. 24.—DINING CAR ON THE PEKING-MUKDEN RAILWAY.



FIG. 25.—PLATFORM BAGGAGE TRUCK ON THE PEKING-HANKOW RAILWAY.

and better estimates this amount was increased to 40,000,000 francs. The final agreement was formally ratified September 7, 1902, by an Imperial decree. The loan bears 5 per cent interest and was issued at 90. Amortization began September 1, 1911, and runs for 20 years, but the balance due can be paid any time after the above date. The loan is guaranteed by the Chinese Government. The Belgian company previously mentioned as building the Peking-Hankow line was also given the contract for building this line. Construction was started in 1903, the first rail was laid in 1905, and the line was opened for traffic in 1907.

While this loan was handled by the Russo-Chinese Bank it is probable that most of the funds came from French or Belgian subscribers. Some years ago the Russo-Chinese Bank disposed of all its interest, and the loan is now entirely under French control.

CLASS OF TRAFFIC.

Roughly, the earnings of this line, amounting to something over \$2,000,000 a year, are derived 25 per cent from passenger traffic and 75 per cent from freight, and more than 75 per cent of the freight earnings are from the coal business. The coal deposits along this line are among the best in China, and much of the present product is a good quality of semianthracite, which is handled in blocks about 10 by 12 by 16 inches in size. The present coal operations on this line are in territory of the Peking Syndicate concession, mentioned later in connection with the Taokow-Chinghua Railway (see p. 98).

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

The operating expenses are about \$1,000,000 and interest charges are \$900,000, with the result that there is only a small margin of profit. While the road's business may increase in the future, the line will probably never be one producing large returns, particularly on account of the handicap of the meter gauge, requiring transshipment of all freight and passengers at the junction with the Peking-Hankow railway.

So far as could be learned no extensions of this line are now contemplated. When it was built it was thought that it might be the nucleus of a very extensive system, but until the gauge is made 4 feet 8½ inches it is not likely that any long lines will be built extending this railway.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK.

The rail is a Belgian section weighing approximately 60 pounds to the yard and, with the fastenings, came from the Han-Yeh-Ping works. Otherwise the remarks regarding the roadway materials on the Peking-Hankow Railway apply in all details to this line.

As on the Peking-Hankow, all the rolling stock is of French and Belgian design and manufacture. This line has 57 locomotives, 51 passenger cars of all classes, 518 freight cars, and 133 service cars. About 70 per cent of this equipment consists of cars suitable for carrying coal, and the average capacity of all cars is over 46,000 pounds, which is high in comparison with the equipment on the lines in China that are of 4 foot 8½ inch gauge.

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FIG. 24.—DINING CAR ON THE PEKING-MUKDEN RAILWAY.



FIG. 25.—PLATFORM BAGGAGE TRUCK ON THE PEKING-HANKOW RAILWAY.

CHINA.

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WORKSHOPS.

The general repair shops are located at Shihchiachuang, near the connection with the Peking-Hankow Railway. These are small shops; they are only for the making of all classes of repairs to the rolling stock of this line and no manufacturing of equipment is attempted.

ORGANIZATION AND PERSONNEL.

This line, while organized along the general arrangement called for by the regulations of the Ministry of Communications, is not provided with anything like the complete organization as outlined for the Peking-Mukden Railway. There is a managing director (Chinese), but the present staff is largely French, this being true to an even greater extent than on the Peking-Hankow Railway. The name shown for this line in the Universal Directory of Railway Officials and Rosenstock's Directory of China is the Tcheng-T'ai Railway.

PURCHASE OF STORES.

For some time past the purchases of this line have been very limited, and when conditions again become normal the former policy of making all possible purchases from France will probably be resumed to a very considerable extent, especially as long as the present French staff is in technical control of the line.

TAOKOW-CHINGHUA (TAO-CHING) RAILWAY.

LOCATION AND EXTENT.

This line is located in northern Honan, the northeastern end being at Taokow, where connection is made with river and canal transportation routes to Tientsin. The line extends in a southwestward direction to Chinghua and the Jamieson mines, with a total length of line of 95 miles. The Peking-Hankow Railway is crossed at Hsinhsiangsien at about the middle of the line, and this point is also approximately the half-way point between Peking and Hankow, being about 370 miles from Peking and about 380 miles from Hankow. What is more important than the railway in this connection is the location and extent of the mining concession covered by the Peking Syndicate. This still includes all of Honan north of the Yellow River, and did include all of the Province of Shansi south of the Great Wall—a triangle including many thousand square miles and probably containing one of the greatest coal fields in the world, much of the coal being of a very high quality and capable of standing long shipment without deterioration. The Peking Syndicate still retains a mining concession for northern Honan, but the Chinese authorities redeemed the Shansi concession by the payment of 2,750,000 taels, although the syndicate obtained a promise of preferential rights in furnishing capital for future developments in this area.

HISTORICAL SURVEY.

The first steps to secure this concession were taken by an Italian, Commendatore Angelo Luzatti, who visited China in 1896, and who apparently studied carefully the mineral resources of this district. He organized a syndicate in 1897 of British and Italian financiers

with a capital of £20,000; this was later increased to £1,500,000, and the object of the syndicate was the development of the rich mineral resources of this district and the transportation and marketing of them. He was ably assisted by a Chinese named Ma Kie-chong, who spoke English and French. In the course of time the project became entirely British, and finally an agreement was made with the British & Chinese (British) Corporation to practically pool interests in the further mining and railway developments north of the Yangtze River.

In July, 1905, the Chinese Government entered into an agreement to take over this line by payment in gold bonds at 90, bearing interest at 5 per cent, to the amount of the actual cost plus 10 per cent—the syndicate still to receive 20 per cent of the net profits. The amount of bonds issued was £700,000, to run for 30 years and redeemable after 1916.

The present control of the railway, while nominally in the hands of the Ministry of Communications, is actually British through the medium of the Peking Syndicate.

Of the earnings of this line about 20 per cent are from passenger business and 80 per cent from freight, about 85 per cent of the latter being from coal.

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

The operating revenue of this line was approximately \$835,000 in 1916, with operating expenses of \$380,700 and interest charges of \$380,000—leaving, after the payment of taxes and other income charges, a nominal surplus, 20 per cent of which goes to the Peking Syndicate.

The right of this syndicate to build the extensive system of railways that it has projected has been a subject of long controversy with the Chinese Government authorities. Several long lines have been projected, particularly one to the Yangtze River at Pukow, but at present no active steps are being taken in the building of any extensions. It is probable that further extensions will be built in the development of the coal mines in this district, in which event the line should become increasingly profitable as the coal traffic grows, especially on account of the high quality of the coal and the practicability of transporting it to several seaports. At present shipments can be made to Tientsin, Peking, and Hankow by the Peking-Hankow line and to Pukow by the Peking-Hankow, Pienlo, and Tientsin-Pukow lines. River and canal shipments can also be made from Takow.

MATERIALS AND EQUIPMENT—WORKSHOPS.

British materials and practice have prevailed entirely on this line.

The equipment of this line is very limited, there being 10 locomotives, 27 passenger cars, and 160 freight cars. These are of British design and manufacture.

This line has somewhat more extensive shops than would seem warranted with the above amount of equipment. Apparently these shops were intended not only for the making of all repairs to rolling stock, but to take care of repairs to the mining equipment as well.

ORGANIZATION.

The Peking Syndicate (Ltd.) acts as manager and administrator of this line. There is a managing director (Chinese), but the staff is all British. The Peking Syndicate is represented in Peking by a resident agent general and engineer in chief, with offices in the Legation Quarter at Peking.

PURCHASE OF STORES.

The purchases of this line have been very small for some time, but the writer was advised by Mr. Frodsham, assistant agent general of the Peking Syndicate, that it expects to undertake considerable work at the conclusion of the war, and that it will continue its policy of making purchases so far as practicable from British sources. Until such time as the Chinese take more active control of this line it will probably remain practically a closed market.

KAIFENG-HONAN (PIENLO-LUNGHAI) LINES.

This system is known by a variety of names, but the official English name used by the Ministry of Communications as Kaifeng-Honan Lines. The Chinese name for the central or original section is Pienlo, and the system is frequently so designated. The eastern section is known as the Eastern Lung hai, and the western section as the Western Lung hai. The system is often referred to as the Lung hai Lines, and at times as the Pienlo-Lung hai Lines.

LOCATION AND EXTENT.

The eastern terminus is at Hsuehowfu, where connections are made with the Tientsin-Pukow. This point is about 210 miles north of Pukow, to which port on the Yangtze River a considerable portion of the business originating on this line is taken. The line runs in a westerly direction through western Kiangsu and northern Honan to Kwanyintang (a total of 344 miles), passing through the important Chinese cities of Kaifengfu and Honanfu and crossing the Peking-Hankow Railway at Changchow, about 430 miles south of Peking and 320 miles north of Hankow. An extension of this line is now under construction farther west to Sianfu, the capital of the Province of Shensi. A considerable part of this line runs through the section of China that is frequently subject to floods, which at times cause much damage. The railway has been a means of affording relief to people made destitute by these floods. There are extensive coal deposits along the central and western portions of the line, but up to the present time there have been no extensive developments.

HISTORICAL SURVEY.

The Pienlo section of this line from Kaifengfu to Hunanfu, a distance of about 120 miles, was first suggested in 1899. The preliminary agreement was made in 1902 between Mr. Sheng, then director general of the Chinese Imperial Railways, and Monsieur Armand Rouffant, representing a Belgian company, the Compagnie Générale des Chemins de Fer et Tramways en Chine. This contract provided a loan of £1,000,000, issued at 90 and bearing 5 per cent interest, to run a total of 30 years, amortization to begin the eleventh

year, but with the important privilege of refunding at par any time after the beginning of amortization. The construction of this part of the line was carried out very expeditiously, to the satisfaction of the Chinese authorities.

In 1912 and 1913 the Chinese authorities decided to extend this line, and as they could not raise the necessary funds from native sources and the above agreement gave this Belgian company preference for furnishing further funds, an additional loan of 250,000,000 francs was negotiated and issued at 94 par, 5 per cent interest, amortization beginning the eleventh year of the loan, and the loan to run a total of 40 years, with the right of redemption of part or all of the loan any time after the tenth year at 102½.

This new agreement made a very important revision in the first agreement, in cancelling the clause for the Belgian company to receive 20 per cent of the net profits. The new loan does not grant the company this portion of the net profits. Both these agreements are, in all features, very similar to the Peking-Hankow original agreement, in which case the loan was refunded by the Anglo-French loan in 1908. Payment of interest and principal is guaranteed by the Chinese Government, and the railway property is also security for this loan.

While this loan was with a Belgian company, most of the actual funds came from French subscribers.

The control of the loan is still Franco-Belgian, with the French interests largely predominating, no doubt.

CLASS OF TRAFFIC.

In 1916 the traffic earnings on the original line, the Pienlo section, were about equally divided between passenger and freight receipts, but with the extensions and development of business there will probably be a greater increase of freight traffic than of passenger traffic. The larger part of the freight traffic consisted of mineral and agricultural products, coal being the largest item.

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

The Pienlo section, with earnings of nearly \$1,287,000 in 1916, showed a surplus approaching \$23,000 after payment of all operating expenses and income charges.

As already mentioned, this line is now being extended to Sianfu, the capital of the Province of Shensi. Several further extensions are considered and probably will be made in the course of time, particularly one to Lanchowfu, the capital of the Province of Kansu, a distance of some 300 miles. It has also been proposed to extend this line to a port east of Hsuehowfu, but the building of this extension is probably somewhat remote and hardly seems warranted in view of the present connections with the Peking-Hankow and Tientsin-Pukow Railways, which make available through interchange of traffic to the Yangtze River ports of Hankow and Pukow.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK—WORKSHOPS.

Portions of this line, particularly the western parts, run through a rough country, which has made construction both difficult and expensive, requiring a considerable number of tunnels and bridges.

The line, however, is well and substantially built, although, as on other Chinese railways, the bridges are designed and constructed along the lines of those on the Peking-Hankow. All the roadway and track materials follow the Franco-Belgian standards and practice, and most of them came from Belgium or France, including the first rail, which was in 12-meter (47-foot 3-inch) lengths. The rail used for recent construction has been the 85-pound Chinese section from the Han-Yeh-Ping works.

This system, like other Chinese Government Railways, has a rather small amount of rolling stock. This is along the lines of the Franco-Belgian practice and most of it is of French or Belgian manufacture but assembled in the workshops at Chengchow.

The general repair shops are at Chengchow and are arranged for the assembling of manufacturing equipment and for the making of all classes of repairs to the rolling stock of these lines.

ORGANIZATION AND PERSONNEL.

There is a director general of these lines, who is now located at Peking. There are also at present several managing directors, but it is probable that, after the completion of the construction, the organization of this line will be changed to the usual operating arrangement, with one managing director in charge of the system, who will probably be located at Chengchow. At present the technical management is almost entirely in the hands of the Belgian staff.

The writer was unable to obtain information enabling him to prepare a complete directory of this line (see p. 265), particularly as regards the separation of the permanent organization from the temporary construction organization.

PURCHASE OF STORES.

Much difficulty has been experienced in obtaining the needed materials for the construction of this line. Since the beginning of the war, much material has been bought from whatever sources were available, when it could not be got in China. It is probable that this line will adopt the general policy of purchases already referred to in connection with the Peking-Hankow line; in fact, it seems quite probable that in the course of time the purchases for the Peking-Hankow Railway, the Cheng-Tai Railway, and the Kaifeng-Honan system may be consolidated and supervised by the Ministry of Communications, especially as the requirements of these lines are more nearly alike than those of any other three lines in China that are all physically connected.

This line will require a considerable amount of additional rolling stock for the operation of the extensions now nearing completion, and it is not thought probable that the need for this can be deferred until such time as it can be furnished from Belgium or France after the end of the war. In fact, information has been received from the American commercial attaché at Peking that the Kaifeng-Honan Railway administration, through the Belgian minister at Peking, has made inquiry concerning the purchase of the equipment from American sources—not only rolling stock but also roadway and track materials.

SHANGHAI-NANKING (HU-NING) RAILWAY.

LOCATION AND EXTENT.

This line starts at Shanghai, at present the most important trading center in China, and extends for 193 miles in a northwesterly direction across the Province of Kiangsu and through the important Chinese cities of Soochow and Chinkiang to Nanking, on the south bank of the Yangtze River, where there is ferry connection with the Tientsin-Pukow Railway at Pukow. There is a 10.5-mile branch from Shanghai to the port of Woosung on the Yangtze River.

HISTORICAL SURVEY.

This line is the first link of what at one time promised to be a very extensive system of British railways in China, to cover the entire length of the Yangtze River Valley and finally to connect with the Indian system of railways through Yunnan and Burma. The proposed Pukow-Sinyang line already mentioned was to be a second link in this connection, which would give entrance to Hankow over the Peking-Hankow Railway. The next link was to be the proposed Hankow-Szechwan line to Chengtu, the capital of the rich and important Province of Szechwan. The fourth link was to be a line from Chengtu to Yunnanfu and the fifth link a line from this point to the Burma frontier. The consummation of the plan for this system appears to be remote at the present writing.

The preliminary agreement for the Shanghai-Nanking line was signed in May, 1898, between Mr. Sheng, then director general of the Chinese Imperial Railway Administration, and the British & Chinese Corporation, for which concern the Hongkong & Shanghai Banking Corporation were the bankers. On account of the Boxer troubles the final agreement was not concluded until July, 1903, and the line was not finally completed and put in service until March, 1908. This railway loan agreement provided for an amount not to exceed £3,250,000, to be issued at 90, bearing 5 per cent, and interest during construction was paid out of the proceeds of the loan on the above terms; £2,225,000 was issued in 1904, and a second issue was made in 1907, but this last was at 95½. The date of maturity of both of these issues is 1954, 50 years from the date of the first issue, and both issues are redeemable at 102½ from 1917 to June, 1929, inclusive, and for the remaining 25 years at par. In connection with a special clause in the agreement regarding land purchases, a third issue was made in December, 1913, for £150,000, issued at 92 and paying 6 per cent interest, and this issue is to mature November 30, 1923.

In addition, there is a complicated provision for certificates to be issued for one-fifth of the outstanding loan—these certificates to be issued to the corporation and to be paid at the dates of the redeeming of the bonds, this payment to be made from 20 per cent of the surplus earnings after payment of all expenses and income charges. There is a somewhat similar provision for the Government to issue certificates for the other four-fifths of the loan, which in turn provides for the disposition of the other 80 per cent of the surplus earnings. This clause has already been the cause of considerable feeling and discussion.

There has been a good deal of discussion with regard to the high cost of this line. The cost, according to Mr. Kyle's study, was about

\$150,000 per mile of line—about \$12,000 more than that of the Tientsin-Pukow and about \$38,500 more than the average cost of all the Chinese Government Railways. One result of this is to give force to the Chinese contention that the foreign engineer-in-chief of such lines should not have unlimited authority as to the making of expenditures. This line, however, extends through a densely populated district and was well and substantially built, with commodious and ornate stations. The capital for the construction of this line was entirely from British subscribers.

PRESENT CONTROL.

On December 31, 1916, there were outstanding capital obligations to the amount of \$33,628,185, of which \$29,955,184 represented mortgage bonds and \$3,672,671 permanent investments in the property by the Chinese Government. On the same date there was an accumulated deficit of \$2,164,800, of which \$1,910,224 represented unextinguished discounts on the funded debt. There is no provision in the loan for yearly amortization, the only provision being the redemption arrangement already mentioned. Financial control of the mortgage bonds is in British hands through the British & Chinese Corporation.

CLASS OF TRAFFIC.

The passenger earnings of this line for the years 1915 and 1916 were about two and three-fourths times as much as the freight earnings, but the freight traffic for some years past has been growing faster than the passenger business. Both passenger fares and freight rates are lower on this line than on any of the other Chinese Government Railways, on account of competition from canal and river transportation. The railway has increased the freight rates considerably in the last few years; between January, 1913, and February, 1915, three \$2 advances were made on certain wagon-load rates.

No extensions of this line are contemplated at the present writing.

PRESENT PROFITS AND OUTLOOK FOR FUTURE.

Both passenger and freight business has been growing steadily, freight rates have been advanced from time to time, and each year is showing a better operating ratio. In 1916, with an increase in operating revenues of \$400,000 over 1915, there was a decrease in operating expenses of about \$20,000. This line runs through a densely populated district, with varied agricultural products and with a growing industrial development, and although there is and will be little mineral traffic the line will probably show an increasing profit from year to year.

ROADWAY AND TRACK MATERIALS.

The roadway and track materials of this line are strictly along the lines of British practice, and most of the materials are of British manufacture, although in recent years some American devices have been used, such as rail anchors. All bridges on this line are permanent structures, following British practice, and are somewhat heavier than the bridges on some of the other Chinese railways, particularly the Peking-Hankow.

ROLLING STOCK.

All rolling stock is along the lines of British practice, and practically all of it is of British manufacture. Since physical connections have been made with the Shanghai-Hangchow-Ningpo Railway, interchange of rolling stock now prevails between these two railways, which are under joint management. A considerable portion of the rolling stock on the latter line is of American design and manufacture. The table on page 76 shows the amount of rolling stock on these two lines, which is proving inadequate to handle the growing business.

WORKSHOPS.

The general workshops are located at Woosung, about 10 miles from Shanghai. These are reasonably well equipped and are arranged for the making of repairs to all classes of rolling stock for both the Shanghai-Nanking and the Shanghai-Hangchow-Ningpo Railways. Capacity is also provided for the erection of a small number of freight and passenger cars.

ORGANIZATION.

The organization of this line conforms, in a general way, to the arrangement called for by the orders of the Ministry of Communications (see p. 63), but the British engineer-in-chief, according to the terms of the agreement, has very extensive executive authority in connection with this line. The general staff of this line also has charge of the Shanghai-Hangchow-Ningpo line, as explained later.

PURCHASE OF STORES.

Purchases for this line and also for the Shanghai-Hangchow-Ningpo are made through the chief storekeeper of the stores department, whose headquarters are at Shanghai. According to the loan agreement, preference is to be given to supplies from Chinese sources, but without doubt preference is next given to articles of British manufacture. Considerable amounts of materials are bought from concerns in Shanghai, and some of these come from American sources. It is not the general practice for this line to advertise for tenders as extensively as certain other lines.

SHANGHAI-HANGCHOW-NINGPO (HU-HANG-YUNG) RAILWAY.

LOCATION AND EXTENT.

This line starts in Shanghai, now using the same passenger station as the Shanghai-Nanking line, and runs 116 miles in a southwesterly direction through the Provinces of Kiangsu and Chekiang to the important city of Hangchow, at the head of the Bay of Hangchow. At Shanghai there is a 4½-mile line to the first terminal built in Shanghai, but this is now used as a branch station and connections are made with the through trains, which are all run from the Shanghai-Nanking station. Near Hangchow there is a 3½-mile branch.

This project contemplates a car ferry across the river at Hangchow on the completion of the line to Ningpo, a total distance of about 110 miles, of which 48½ miles are now completed and in service from Ningpo to the Tsao Ngo River. About 60 miles are still to be con-

structed, and this work is now in progress but proceeding very slowly. Ningpo is a little south of east of Hangchow and is one of the important trade centers of this densely populated part of China.

EXTENSIONS SUGGESTED.

It seems probable that in the course of time this line will be extended southwestward from Hangchow through the Provinces of Chekiang and Kiangsi, connecting with the Kiangsi (Nan-Shan) Railway near Nanchang, thus making rail connections from Shanghai to the Yangtze River port of Kiukiang and running through a country that would probably furnish a profitable local traffic, particularly in carrying agricultural and mineral products to the ports of Shanghai, Hangchow, and Kiukiang.

A line has also been projected between Hangchow and Wuhu, an important port on the Yangtze River between Nanking and Kiukiang, and some work was done on the Wuhu end of this line, but there is little probability of this line being completed in the immediate future.

There has also been a suggestion (which seems entirely practical) to extend this line farther from Nanchang to Shiuchow in the Province of Kwangtung, where connections would be made with the Canton-Hankow line when the latter is completed, thus making an interior rail line from all the above-mentioned ports to the ports of Canton and Hankow and the densely populated district in southern China. This would tend to stabilize conditions in this part of China. While these lines, if built, might in some ways be considered as competing with water transportation, the result, in all probability, would be a supplementing of both the water and rail transportation, particularly in the carrying of agricultural products and minerals to these ports. In no instance would these additional lines parallel present water-transportation routes, as did the Shanghai-Nanking Railway between Shanghai and Chinkiang and Nanking and the Shanghai-Hangchow-Ningpo Railway between Shanghai and Hangchow.

HISTORICAL SURVEY.

The preliminary agreement for this line, under the title of the Soochow, Hangchow & Ningpo Railway, was made in 1898 and, as already mentioned, was one of the features of the "Battle for Concessions," in which the British & Chinese Corporation secured this concession and the concessions for the Shanghai-Nanking and Canton-Kowloon lines, which have since been built, and for the Pukow-Sinyang line, which is now under agreement, though little is being done at present on its construction.

The British & Chinese Corporation, after securing these concessions, devoted all its attention and available funds to the completion of the Shanghai-Nanking and the Canton-Kowloon lines and did nothing with this concession. Mr. Sheng, already mentioned several times as then director general of the Chinese Imperial Government Railway Administration, notified the corporation in 1903 of the cancellation of this concession, and on September 23, 1905, an imperial edict was issued confirming this cancellation and transferring the right of construction and operation to a Provincial Railway Bureau, the road to be built with Chinese capital only. With this authority

two companies, the Kiangsi Railway Co. and the Chekiang Railway Co., were organized—the first with \$3,000,000 and the second with \$5,000,000, all subscribed and paid up by Chinese subscribers. After the Chinese had made this progress and had the work under way, the British & Chinese Corporation took the matter up energetically and would not accept the cancellation of the concession, but after much negotiation a compromise was effected and an agreement signed for a loan of £1,500,000, at 5 per cent. However, the funds from this were never actually used in the construction of the railway, although the Chinese Government carried the loan for some five years and paid the interest on it, this condition prevailing until the road was nationalized in 1913 as a part of the present Chinese Government Railways under the direction of the Ministry of Communications.

PRESENT CONTROL AND ORGANIZATION.

At present there is a managing director in charge of both the Shanghai-Nanking and this line, with headquarters at Shanghai; and the British staff in charge of the Shanghai-Nanking is in charge of the technical administration on this line but does not have such executive authority as is exercised on the Shanghai-Nanking line, on which the loan agreement is still in full force. It might possibly be correct to say that the duties of the British staff on the Shanghai-Hangchow-Ningpo line are chiefly technical and advisory, though they are administrative as well to a very considerable extent. The staff of both lines is partly British and partly Chinese, the most important positions being filled by the British.

CLASS OF TRAFFIC—OUTLOOK FOR FUTURE.

The political troubles in the Province of Chekiang for more than two months in the first half of 1916 affected adversely the earnings for that year. In 1915 the passenger earnings were two and one-half times the freight earnings, and in 1916 the passenger earnings were about three times the freight earnings. However, since this line passes through a rich agricultural district and considerable industrial development may be expected to take place, it is probable that the freight business will grow faster than the passenger business and that, in the course of time, the line will show a profit after paying all operating expenses and income charges.

ROADWAY AND TRACK MATERIALS.

The Chinese have pointed to this railway as an example of what should be the initial expense incurred in building Chinese railways of this class. The construction cost per mile, as shown by Mr. Kyle's study, is a little less than \$45,000 per mile, against \$188,000 for the Canton-Kowloon and \$150,000 for the Shanghai-Nanking. British engineers in China, on the other hand, state that this line is of very inferior construction and that poor, cheap materials were used.

Preference was given to roadway and track materials from Chinese sources. The rails and fastenings came from the Han-Yeh-Ping works and are mostly the 85-pound standard Chinese section. All purchases were made in competition, and a good deal of the roadway and track material was purchased from American sources.

ROLLING STOCK.

This line has a decided variety of rolling stock, all of which was purchased under competition and furnished from American, British, German, and Chinese sources. Of the 36 locomotives, 11 are American, 12 British, and 13 German. Many of the passenger cars are of American manufacture; some of them have been criticized on account of makeshift changes to meet the specifications, but these faults seem to have had their origin in the specifications rather than in the workmanship of the equipment. This situation, however, affords a very good example of the desirability (in fact, the necessity) of the Chinese Government Railways being permitted, without regard to the restrictions of the existing loan agreements, to lay out standard designs and formulate definite specifications for all their requirements.

WORKSHOPS.

In addition to the Woosung shops of the Shanghai-Nanking Railway, already mentioned, there are workshops at Hangchow, where some repairs to the rolling stock are taken care of and where some of the assembling of the original equipment was handled.

PURCHASE OF STORES.

Substantially the same remarks apply to the purchases for this line as to those for the Shanghai-Nanking, the same chief storekeeper being in charge of stores and purchases for both lines.

CANTON-HANKOW (YUEH-HAN) RAILWAY SYSTEM.

This system consists of the line from Wuchang to Chuchow, the Chuchow-Pinghsiang Railway, the Canton-Samshui (Kwang-Sam) Railway, and the Kwangtung Yueh-Han Railway Co. (Ltd.).

LOCATION AND EXTENT.

The trunk line of this system is to connect Canton and its densely settled hinterland by a line running north through the Provinces of Kwangtung, Hunan, and Hupeh, with Wuchang, on the south bank of the Yangtze River opposite Hankow, and, through this gateway, with North China by way of the Peking-Hankow Railway and with the Yangtze River ports by the present river lines. Changsha is a very important city on this line, about 200 miles south of Hankow; connection is made there with water transportation lines. This railway, without question, is the most important line now being constructed or contemplated in any part of China, and its completion would doubtless do more to stabilize China as a whole than the completion of any other one line, except possibly a line to Chengtu in Szechwan.

This system is to be constituted by the main trunk line from Canton to Wuchang, together with the present branches from Canton to Samshui and from Chuchow to Pinghsiang, both of which have been completed and in service for several years. The latter line is the one that, for several years, has transported the coal from the Pinghsiang collieries to Chuchow, whence this supply of fuel has been taken to Hankow for the Han-Yeh-Ping Iron and Steel Works.

Both these branches at present come under the direction of the Ministry of Communications. The first is known as the Canton-Samshui (Kwang-Sam) line of the Chinese Government Railways. While this will ultimately become a part of the Canton-Hankow system, it will continue to be operated for some years as a separate line—probably until the main trunk line is completed. The line from Changsha to Pinghsiang known as the Chuchow-Pinghsiang line of the Chinese Government Railways, has also been operated as a separate line, but since the practical completion of the new line from Wuchang to Changsha this entire stretch of 265 miles from Wuchang to Pinghsiang is now being operated as the Canton-Hankow Railway, with headquarters at Wuchang.

The line from Canton to Shiuchow, a distance of about 140 miles, is practically completed but is being operated by a private corporation known as the Kwangtung Yueh-Han Railway Co. (Ltd.). When the remainder of this trunk line is completed, however, this section will be taken over as a part of the Canton-Hankow main line, under the direction of the Ministry of Communications, to be operated as one of the Chinese Government Railways.

There is no physical connection between the south end of this line and the Canton-Samshui lines at Canton. The city of Canton lies on the northeast side of the Pearl River. On this side the Kwangtung Railway starts and runs in a northerly direction, while the Canton-Samshui starts on the southwest side of the river, opposite the main city of Canton, and runs in a southwesterly direction. There is also no physical connection between either of these lines and the Canton-Kowloon section of the Chinese Government Railways, which will be mentioned later. The part of the main trunk line that remains to be completed, from Chuchow to Shiuchow (a distance of less than 250 miles), is through a rough country where many tunnels and much bridging will be required. This condition, with the present high prices of materials, will probably make the total cost of this work, upon completion, about \$25,000,000 (gold).

HISTORICAL SURVEY.

The history of this line is long and varied. The Canton-Hankow project at one time constituted what to-day may be considered the only actual railway concession ever held by American interests in China. The Hukuang Railway loans and the Siems-Carey projects can hardly be regarded as concessions, but are rather loan and construction agreements for the building of railways for the Chinese Government.

The original agreement for this line was held by the American-Chinese Development Co. and was signed in April, 1898. Mr. Sheng, already mentioned several times, was then the director-general of this project and also of the Peking-Hankow Railway. Senator Calvin S. Brice, backed by strong American interests, was the head of the American syndicate. The amount of the loan was \$40,000,000 (gold), issued at 90 per cent, paying 5 per cent interest, running for 50 years, and to be secured on the property of the railway and guaranteed by the Chinese Imperial Government. In addition, the syndicate was to receive 5 per cent for services and supervision of the purchase of materials, as well as 20 per cent of the net earnings

after payment of operating expenses and all income charges. The Spanish-American war first delayed action on this project; next the Empress Dowager, in control at Peking, apparently put obstructions in the way of progress; but in the course of time surveys were made, followed by some construction work, which ultimately resulted in the completion of the Canton-Samshui and the Chuchow-Pinghsiang sections, now operated by the Ministry of Communications, and the Kwangtung Yueh-Han Railway, as already mentioned.

The death of Senator Brice removed the chief personal force of this enterprise and later resulted in Belgian interests' getting majority control of the development company, though it was against the spirit (and probably the actual terms) of the agreement to allow the nationality of the control to change. After considerable agitation and insistence on the part of the Chinese, American interests again obtained control of the Development Co.; but the Chinese authorities were not satisfied to allow the work to proceed and the American interests were not energetic in pushing the matter, with the result that the project was taken over by the Chinese Government and the transaction with the American-Chinese Development Co. was finally concluded in 1905 by the payment of \$6,750,000 (gold) for title to all the work done and the profits and good will of the entire enterprise.

It was first attempted to raise these funds among the Chinese gentry and the interests in South China that had so constantly opposed the construction of this line by the American-Chinese Development Co., but when the time actually came to subscribe, the funds were not forthcoming, and the above amount was finally obtained from the government of the British colony of Hongkong and thus became a British loan. It was contemplated, after the elimination of the American-Chinese Development Co., that the Chinese should take the work in hand and complete this line from native resources, but conditions finally led to the Hukuang Railway loan, the downfall of the Manchu dynasty, and Mr. Sheng's dismissal.

The Hukuang Railway loan agreement has already been mentioned, as has the combining of the funds from the American and British loans to complete the Wuchang-Changsha section, which has recently been put in service but which has exhausted all the available funds. The question of additional funds to complete this important trunk line will doubtless come up in the course of a short time.

The failure of the American-Chinese Development Co. to complete this project was no doubt a real misfortune from the standpoint of Chinese interest and very regrettable from the American point of view.

The Chuchow-Pinghsiang branch was surveyed by the American engineers, although this branch line was not included in the original agreement with the American-Chinese Development Co. Work was started in 1899 for the specific purpose of completing this line for the transportation of coal from the Anyuen coal mines at Pinghsiang to Chuchow, to be taken from there by water to the Han-Yeh-Ping Iron Works at Hankow. Although the construction was rather difficult, the cost, according to Mr. Kyle's study, totals a little less than \$50,000 per mile.

Work on the Canton-Samshui line was started in the latter part of 1902. The first section to Fatshan, which is double track, was completed and put in service before the end of 1903, and the entire line, the remainder of which is single track, was completed and put in service September, 1905. The construction cost of this line, according to Mr. Kyle's study, is about \$107,500 per mile. The line runs through a very densely populated district and has been profitable on account of the large passenger business carried ever since the completion of the line, although the freight business is negligible. A connection from this line at Fatshan to Kongmoon, a distance of about 40 miles, to connect with the Sunning (privately owned) railway has been discussed, but at present nothing tangible is being done toward its actual construction.

The Kwangtung section, extending from Canton to the Kwangtung-Hunan border, a distance of about 210 miles, was taken in hand by the Kwangtung mercantile administration of the Yueh-Han Railway, a Chinese company with a nominal capital of \$4,000,000, of which only a portion was paid up. This took place after the American-Chinese Development Co. interests had been bought out and taken over by the Chinese Government.

This Chinese company is now known as the Kwangtung Yueh-Han Co. (Ltd.). The line from Kwangtung to Shiuchow, a distance of about 140 miles, has been put in service and surveys have been made for the remaining section of about 70 miles. The construction of this latter will be rather difficult and expensive, because of the fact that the line runs through very rough country, where about 60 tunnels with a total length of 10,000 feet will be required, as well as some rather expensive bridge work.

SOURCE OF CAPITAL AND PRESENT CONTROL.

The writer was unable to obtain information that would make possible an understanding of the general balance sheets of the Canton-Hankow system as a whole or even in part. The Chinese Government Railways consolidated report shows no interest charges for the Chuchow-Pinghsiang and Canton-Samshui sections, leading to the conclusion that these lines are now coming entirely under the head of permanent Chinese Government investments—the investment assets being \$4,750,000 and \$16,750,000, respectively. The Kwangtung Yueh-Han Railway Co. (Ltd.) seems to carry the obligation of the loan from the Hongkong government for £1,350,000, which bears interest at 4½ per cent and the proceeds of which were used to pay the \$6,750,000 (gold) for the purchase of the American-Chinese Development Co.'s interest, as previously explained.

The line from Changsha to Wuchang is covered by the Hukuang Railway loans, as already explained, but the writer was unable to obtain the details of these amounts or their allocation to the different sections of the Hukuang railways, if there is such an assignment of these expenditures.

CLASS OF TRAFFIC.

The Wuchang-Changsha section has not been in service long enough for one to arrive at any conclusion as to the traffic that will develop. However, in view of the fact that about 85 per cent of the traffic on the Chuchow-Pinghsiang consisted of mineral products

(nearly all coal), it is probable that, notwithstanding water competition from Chuchow and Changsha, considerable through-coal traffic will develop, particularly during the dry season when water transportation is at times suspended.

Traffic on the Canton-Samshui line is almost entirely passenger business and, on account of the dense population in this section, this will no doubt continue to constitute the largest part of the business. The results from this line seem to justify the suggestion made later concerning the construction of electric lines in this and similar districts of China for the handling of passenger and light goods business by electric railways, as has been done in Japan, particularly in the Osaka industrial district. The traffic on the Sunning Railway, a private corporation in the same district (see p. 119), affords further evidence in support of this suggestion.

PRESENT EARNING CAPACITY AND OUTLOOK FOR FUTURE.

The Chuchow-Pinghsiang section has shown a small net profit for several years, but it is doubtful whether this will be the case with the line now from Wuchang to Pinghsiang, even including the traffic to the important intermediate centers of Changsha and Yochow, both of which have water transportation facilities.

The Canton-Samshui has shown very satisfactory profits for several years, but it is not probable that these will be materially increased until extensions are made to draw more traffic over this line and also to develop freight traffic. The proposed connection with the Sunning Railway would doubtless benefit both lines.

There are no published reports of the Kwangtung Railway and it is impossible to obtain reliable data, but it is understood that this line shows no profit and probably will not do so until the main trunk line is completed and both through and local traffic developed.

As regards the prospective earning capacity of this system as a whole, it is very likely, on account of the high costs up to the present time and the probable heavy expense for completion, that the system will not show any profits for several years until the through and local business has expanded—especially the coal traffic that may be expected to develop from the Pinghsiang fields to Canton and through that port to the other markets of South China, Indo-China, the East Indies, and the Philippine Islands.

ROADWAY AND TRACK MATERIALS.

A clear statement of the materials used in these lines thus far is a rather difficult matter, on account of the length of time involved and the changes of engineers during this interval. The materials used on the new line from Wuchang to Changsha have conformed, in general, to British standards and practice, preference being given to Chinese sources and next to British manufacturers, although a good many of these articles have come from America. The bridges on this line are largely from American concerns, although there was considerable controversy over the specifications, finally resulting in the recall of the first specifications and the sending out of invitations for second tenders. The specifications were reduced from Cooper E-45 to Cooper E-40, although the increase in the price of steel in the

meantime resulted in a substantially higher price for the lighter bridges.

The Chuchow-Pinghsiang was built mostly with American materials, but under the direction of a German engineer in charge of the coal mines who also had charge of this line. Most of the renewals have been made with German materials.

The Canton-Samshui line was also constructed mostly with American materials, but a variety of materials have been used in the renewals. The rail is 75 pounds, American Society of Civil Engineers section, of American manufacture. The double-track section is now laid with steel ties of the same design as those mentioned later in connection with the Yunnan line (see p. 129 and figs. 14 and 15). These came from France or Belgium. White ants are very destructive to wooden ties in this part of China, eating all kinds of ordinary timber. It is said that they do not attack creosoted timber, and about 80 per cent of this line is now laid with creosoted Oregon pine ties, which, it is stated, have a life of from seven to eight years.

The roadway and track materials for the Kwangtung line that are not of Chinese manufacture came from American sources. The rail and fastenings were furnished from the Han-Yeh-Ping Works.

ROLLING STOCK.

As with the roadway and track materials, it is rather difficult to cover by a clear statement the situation with regard to rolling stock on these lines.

The equipment on the Wuchang section conforms, in general, to British specifications and practices, and, although the last locomotives bought were of American manufacture, they were built to meet British specifications. This point gave rise to much controversy as to the interpretation of the terms of the loan agreement; the matter should be fully clarified in the making of any future joint loans.

The original equipment of the Pinghsiang section was practically all of American manufacture and, as in the case of the road and track material, the German engineer in charge of the mines and of this line has largely substituted equipment of German manufacture.

The equipment on the Samshui line is mostly of American manufacture. The first three engines were small secondhand locomotives formerly used on the Manhattan Elevated Railways in New York. These are still in service. This line at present has 6 large and 3 small locomotives, 33 passenger cars, 29 freight cars, and 3 service cars.

The Kwangtung line has 21 locomotives, 35 passenger cars, and 195 freight cars. Fifty-nine of the freight cars came from the Tongshan shops of the Peking-Mukden Railway, and most of the other equipment is of American manufacture, particularly the locomotives. A good many of the freight cars were originally used for construction and the handling of ballast but are now being employed for commercial traffic.

WORKSHOPS.

The new section of this line has complete and up-to-date shops at Wuchang, which are capable of handling all classes of repair work for the 264 miles of line, although the old shops of the Pinghsiang section will probably be continued in service.

The shops of the Samshui section are small and have relatively little equipment, but they seem to be capable of handling the repairs for this short line.

The Kwangtung line has small shops in temporary buildings near Canton, but these are less capable than the Samshui shops of handling all classes of repair work necessary for the maintenance of the equipment.

ORGANIZATION AND PERSONNEL.

The Wuchang section is under the general supervision of the director general of the Hukuang Railways, Dr. Jeme Tien-Yow, the well-known Chinese civil engineer, whose headquarters are at Hankow. The administration of this section is in the hands of a managing director located at Wuchang, and the present technical staff is largely British, in accordance with the terms of the loan. The former staff of the Pinghsiang section has been merged with this staff and the separate organization discontinued.

There is a managing director and a small staff of Chinese for the Canton-Samshui line, with headquarters at Canton. There is also a director, a small staff of Chinese, and an American advisory engineer for the Kwangtung line, with headquarters at Canton. For directories of the officials of these lines, see pages 265 and 266.

PURCHASE OF STORES.

The purchases for the Wuchang section are handled by the chief storekeeper (British), who is located at Wuchang. The purchases of material for the construction of this line were made under the terms of the Hukuang Railway loan agreement, concerning which there has been considerable controversy, as already mentioned. It is probable that there will be a continuance of the preference given to materials of British origin after those from Chinese sources.

Chief Engineer Johnson (Chinese) of the Samshui line has charge of technical matters and recommends purchases, which are made through the managing director of this line, located at Canton.

On the Kwangtung line the director, Mr. K. H. Au, appears to have full authority in the matter of purchases. Mr. D. S. Williams (American) acts in an advisory capacity in this connection.

CANTON-KOWLOON (CHUI-KUANG) RAILWAY (CHINESE SECTION).

LOCATION AND EXTENT.

This is the line between Canton and the British colony of Hongkong and is in two sections. The British section starts at Kowloon, opposite the city of Victoria on the island of Hongkong (there is a ferry connection between these cities), and runs through the leased territory of Kowloon to Samchun, a distance of 22 miles.

The Chinese section starts at Samchun and runs to the southeastern part of the Chinese city of Canton, a distance of 89 miles, making a total of 111 miles from Kowloon to Canton. A line around the city of Canton has been suggested in connection with the Kwangtung line, but no action has been taken toward the actual construction of this link.

HISTORICAL SURVEY.

The island of Hongkong, by concession on the part of China, became a British Crown colony in 1843. A perpetual lease for a small area on the mainland at Kowloon was made in 1858 and was confirmed by the Imperial Chinese Government in 1860. In 1898 the agreement for the present leased territory was signed, this lease providing for British jurisdiction over this territory for a term of 99 years. Hongkong has an excellent harbor and is one of the largest transshipping ports of the Far East—in fact, one of the largest in the world.

The preliminary agreement for the Canton-Kowloon Railway was signed in 1898. No progress was made in the construction of this line for several years, until the British interests in Hongkong in 1905, realizing that the prospective completion of the Canton-Hankow Railway and the possible provision of deep-water harbor facilities near Canton might affect very adversely Hongkong's strong shipping position, took vigorous action to force the building of the present line by the British & Chinese Corporation, with the result that in March, 1907, the final agreement was signed for the construction of the Chinese section by loans of £1,500,000, issued at 94, bearing 5 per cent interest, the total life of the loan to be 30 years. Amortization is to begin at the end of 12½ years from the date of the loan and to be completed at the end of the 30 years by the payment of equal amounts annually. The loan can be redeemed at 102 from the end of the 12½ years to the end of the twenty-fifth year, and for the remainder of the life of the loan at par. In this instance the corporation received a lump sum of £35,000 for handling the purchase of the construction materials and equipment instead of the usual percentage commission.

The line was completed in October, 1911. The agreement provides for a British engineer-in-chief and a British chief accountant. The terms of this agreement represent what British interests have contended should be the form of contract to safeguard loan funds in the building of Chinese railways, and this form of agreement has become known as the "Canton-Kowloon type."

The cost of this line, according to Mr. Kyle's study, is more than \$188,000 per mile, roughly divided as follows: Interest charges during construction, \$37,000; general charges, \$17,700; land, \$19,000; grading, \$21,000; bridges, \$25,750; track, \$30,900; stations and bridges, \$9,800; rolling stock, \$14,200. The total is about \$38,000 higher than that for any other Chinese Government railway.

This line, like the Shanghai-Nanking, competes with water transportation. Neither of these lines has been profitable, and, even with the lowest freight rates in China, they have to depend almost entirely on passenger business for their earnings.

The capital for the Canton-Kowloon Railway was entirely from British sources, and it is under British control at the present time, the terms of the agreement being still in full force.

OPERATING REVENUES AND EXPENSES.

About 90 per cent of the earnings of this line are from passenger traffic, and practically all of the freight traffic is handled with mixed trains.

The operating revenues in 1916 were \$794,223 and the operating expenses \$829,663, giving an actual operating loss of \$35,550, which,

with interest charges of \$701,747 and other income charges, made a net deficit of \$787,009 for the year. This line has been operated at a loss since it was first opened, and is probably the only line of the present Chinese Government Railways under the actual control of the Ministry of Communications that will not show a profit for a long time, if ever.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK.

The construction of this line, with the exception of the rail, was with British materials, and, as a rule, British practice has prevailed in the case of all maintenance and renewal materials. The rail is 85-pound Chinese standard section from the Han-Yeh-Ping Works. Most of the ties are Australian hardwoods. There are 46 steel bridges and 39 arches on this section.

The rolling stock is of British design and manufacture, except certain of the freight-car bodies, part of which came from the Tangshan shops and part from the Whampoa Dock Co. at Hongkong. The equipment of the line consists of 14 locomotives, 41 passenger cars, and 67 goods wagons.

ORGANIZATION—PURCHASE OF STORES.

There is a managing director (Chinese) in charge of this line, with a small staff. The position of engineer-in-chief is filled by a British engineer, as provided by the agreement. The directory of these officials is given on page 267.

Preference is given to British materials, after those from Chinese sources.

CANTON-KOWLOON RAILWAY (BRITISH SECTION).

The main line of this railway is fully covered in the description of the Chinese section. In addition, there is a line of 2-foot gauge from Fanling to Shatowkok and Mirs Bay, a distance of about 8 miles.

HISTORICAL SURVEY.

This line was constructed by the government of the British colony of Hongkong with the definite object of protecting the large shipping interests of this excellent port. The work was begun in 1905 and completed about the same time that the Chinese section was finished in 1911. This line being entirely in the Kowloon leased territory, no loan agreement was made with the Chinese Government, and the funds were supplied entirely by the government of the colony of Hongkong. The line, running through rough country, was expensive to construct, particularly in view of the high standard of the work. The total capital expenditure to the end of 1916 was about \$14,500,000 Hongkong currency, not including about \$90,000 Hongkong currency for the construction of the Fanling branch. A considerable amount of reclamation has been done around the Kowloon terminal, and in 1916 a very substantial and ornate passenger station was built at Kowloon—both included in the above expenditure.

The remarks regarding the class of traffic on the Chinese section apply in all particulars to the British section. Through service is maintained between Kowloon and Canton over the two sections.

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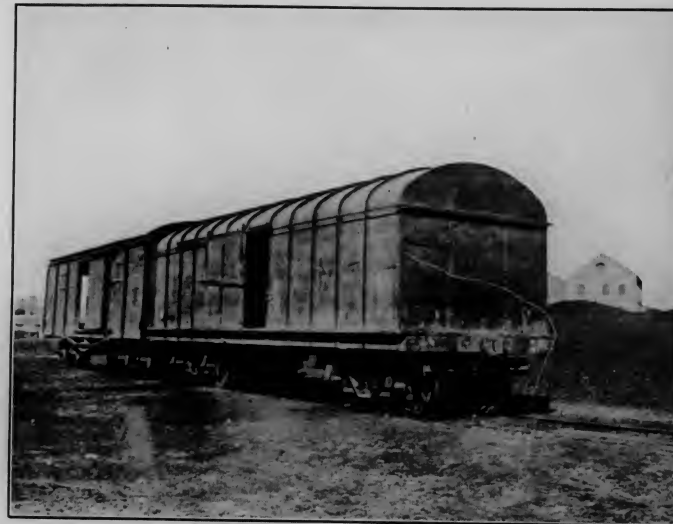


FIG. 26.—TYPE OF BOX CAR USED ON THE CHINESE GOVERNMENT RAILWAYS.



FIG. 27.—TYPE OF TANK CAR FOR HANDLING REFINED PETROLEUM PRODUCTS ON THE CHINESE GOVERNMENT RAILWAYS.

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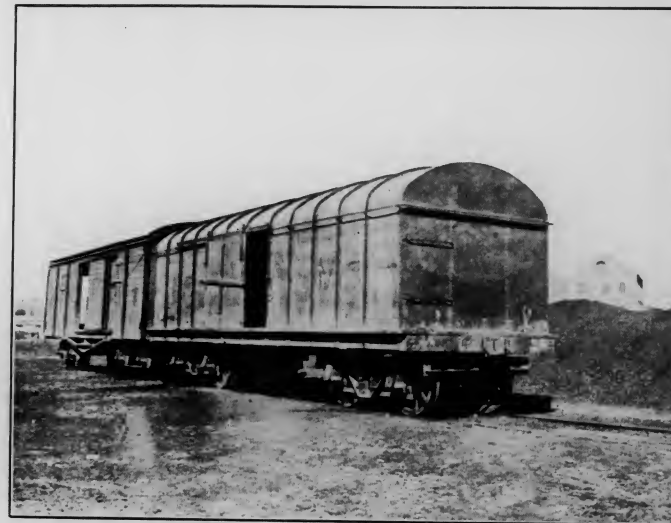


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FIG. 27.—TYPE OF TANK CAR FOR HANDLING REFINED PETROLEUM PRODUCTS ON THE CHINESE GOVERNMENT RAILWAYS.

EARNING CAPACITY.

Operating revenues in 1916 were \$366,216 and operating expenses \$296,692, leaving a balance to net operating income of \$69,624, which would fall far short of paying interest charges on the capital expenditure for this line. The net operating revenue for the year 1915 was \$46,500, making a still poorer showing.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK—WORKSHOPS.

The construction of this section was rather difficult. There are five tunnels; the longest is 7,256 feet, but the others are short, being 924, 350, 175, and 150 feet in length. All the track materials are from British sources; the rail is 85-pound British standard section and the ties are of Australian hardwoods.

The rolling stock is all of British manufacture except one 2-foot-gauge locomotive of German manufacture, which was purchased in connection with a number of construction dump cars. The present equipment consists of 11 locomotives, 27 passenger cars, and 50 freight cars for 4½-foot gauge, and 3 locomotives, 6 passenger cars, and 3 goods wagons for 2-foot gauge.

The Kowloon workshop is provided with shop facilities adequate for a line of this extent and any amount of equipment that it may be expected to have in the future.

ADMINISTRATION AND PURCHASE OF STORES.

The line is under the administration of a managing director and a small staff, all British.

British materials are naturally given preference, though many of the requirements are bought from the various concerns in Hongkong.

FUKIEN (CHANG-HSIA) RAILWAY; CHANGCHOW-AMOI.

LOCATION AND EXTENT.

This line starts at Sungsu, on the mainland, about 3 miles across the bay from the city of Amoy. The line was projected to go to Changchow, a distance of about 33 miles, but construction was stopped at Kiangtungkiao, where the line will cross the Pakkoe River. The length of the completed line is about 20 miles. This line is located in the Province of Fukien, which is claimed by Japan as one of its "spheres of influence"—this claim including the right to finance all railways for which the Chinese can not raise money from native sources.

HISTORICAL SURVEY.¹

The Merchants Fukien Railway Co. was organized in 1905 by Mr. Chen-Pao-chen, and it was proposed to build lines from Amoy to the Provinces of Kiangsi and Kwangtung. The original capital was \$6,000,000, in shares or debentures of \$5, but it is understood that even the subscriptions received were not paid in full. Many of the subscribers were said to be Chinese residents of the Straits Settlements.

Surveys were made in 1906 and construction work was started some time later, but in 1909 all the available funds were exhausted

¹ Based on Mr. Hsu's "Railway Problems of China".

and a loan of \$500,000 was made from the Bank of Communications, which institution is under the direction of the Ministry of Communications. By 1914 only the present length of line had been constructed and further subscriptions from the merchants could not be secured. About this time the project, in some way, was transferred to the Ministry of Communications; the owners of the debentures made some claims on account of their interest, but these seem to have been disallowed. Since that time the line has been operated as one of the Chinese Government Railways, under the direction of the Ministry of Communications. It is generally understood that a Japanese loan is now held against this line and that any further extensions will be financed by the Japanese.

OPERATING REVENUES AND EXPENSES—FUTURE PROSPECTS.

There seems to be no funded debt on this line, but operating revenues were insufficient to meet operating expenses for both 1915 and 1916, and after the payment of all income charges there was a deficit of more than \$150,000—this with less than \$50,000 operating revenues for both these years.

This line is entirely disconnected and many miles away from any of the other Chinese Government Railways, and it is not likely that it will be extended beyond Changchow for some years, although it was first planned to build this line to Chaochow, where it would connect with the privately owned line from Swatow to Chaochowfu, which project, in turn, may be extended to connect with the Canton-Kowloon at Shikling, near the Canton end of this latter line. The building of these extensions is probably remote, especially as they are both paralleled by ocean transportation lines.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK.

The rails for this line were furnished from the Han-Yeh-Ping Works, the ties were purchased from Japan, and the bridges and other track materials came from American sources.

Of the first two locomotives, one was of American manufacture and the other German. The remainder of the rolling stock is largely of American manufacture.

ADMINISTRATION AND PURCHASE OF STORES.

The administration of this line at present is under a managing director, Mr. Wang Ching Hsien, with headquarters at Amoy. A very small Chinese staff is employed in the maintenance and operation of the line. All purchases are made under the direction of the managing director.

V. CHINESE PRIVATE RAILWAYS.¹

SUNNING (HSINNING) RAILWAY.

LOCATION AND EXTENT.

This line, which is very frequently spoken of by foreigners as the Hsinning Railway (its Chinese name), runs through the Province of Kwangtung from Kongmoon to the harbor of Samkaphoi, a short distance southwest of the Portuguese settlement of Macao. The length of the line is about 67 miles, and it is stated that a population of considerably more than one million people is now served directly by this line. Sunning and Kungyi are two of the larger towns served in this densely populated district.

Some extensions are contemplated, one of which has already been mentioned in connection with the Samshui line—to extend from Fatshan to Kongmoon, a distance of something more than 40 miles. It would seem that a system combining the Sunning Railway, the Samshui line and the contemplated extensions might be electrified and be made to yield unusually good returns, like the electric lines in the Osaka industrial district of Japan. This suggestion will be referred to later (see p. 252).

HISTORICAL SURVEY.

This railway is the only real example of private railway enterprise in China depending on the individual initiative of one man. The line has been financed, constructed, and operated by Mr. Hee Chin-Gee, who was formerly a resident of Seattle, Wash., worked on the Great Northern Railway, returned to China some years ago, and has since devoted all his time to this project, although he is now quite an elderly man.

The first section built, from Kungyi to Sunning, a distance of 15 miles, was opened in January, 1908, and since that time extensions have been added from Kungyi to Kongmoon and from Sunning to Samkaphoi, making a total mileage of something more than 67 miles. The original Sunning company had a capital of \$2,660,000; this was later increased to \$4,360,120, of which \$1,000,000 represents loans from Chinese merchants, particularly from Mr. Hee's Hongkong friends. Mr. Hee claims that the project now represents an investment of about \$4,500,000 and that the road has, in general, paid well. He also states he could use about \$3,000,000 Mex. in making extensions that would not only pay well themselves, but would also make the existing line show increased earnings. This line is characterized by a number of features that were designed to conform to Chinese beliefs with regard to grades and the crossing of ponds and streams, one result being some rather sharp curvatures in the alignment.

¹ The Kwangtung Yueh-Han Railway Co. (Ltd.) has been referred to at length as part of the Canton-Hankow Railway system, although at present it is privately operated and is so shown in the table on page 43.

The greater part of the earnings are from passenger traffic, but sufficient freight traffic has been developed to show the possibility of such lines if the enterprise of private ownership is put behind the development of the traffic.

ROADWAY AND TRACK MATERIALS—ROLLING STOCK—WORKSHOPS.

The rail is mostly 60-pound. Some of the first came from Belgium and Germany. In recent years preference has been given to Chinese materials, and next, to those of American manufacture.

The present rolling stock consists of 15 locomotives (12 American and 3 German), about 50 passenger cars, and about 100 freight cars. These last are largely of American manufacture, although equipped with side buffers and the screw-ball type of couplers. Two of the locomotives were recently furnished by one of the large American locomotive companies.

There are small shops at Sunning for the making of repairs to this equipment.

ADMINISTRATION AND PURCHASE OF STORES.

Mr. Hee is president and general manager, and the railway is run entirely under his direction with the assistance of a small Chinese staff. He has an office in Hongkong where he spends a portion of his time. Mr. Hee gives his personal attention to all purchases, most of which are made when he is in Hongkong.

SWATOW-CHAOCHOW (CHAO-SHAN) RAILWAY.

LOCATION AND EXTENT.

This line starts at a point on one of the branches of the Han River across from the city of Swatow, and runs in a northerly direction to Yeekai, a distance of about 27 miles. Yeekai is about 3 miles past Chaochow, a city of some 400,000 people. The population of Swatow is estimated at about 31,000, of whom several hundred are foreigners.

HISTORY.

The Chaochow & Swatow Railway Co. (Ltd.), a distinctly Chinese company, was organized about 1903, when concessions were granted to a Chinese merchant named Chang Yu-nan, who had amassed a fortune in Java. The company is registered under the Hongkong ordinances and has a director residing there.

Construction work was started in 1904 and carried out under the direction and management of the Mitsui Bussan Kaisha (Japanese). The line was completed in November, 1906.

The business consists largely of passenger traffic, and only a small amount of freight is carried. This is largely on account of the fact that the line competes at all points with the Han River transportation lines.

EARNING CAPACITY.

It is stated that in some years this railway does not pay operating expenses. No dividends have ever been paid, and it is not probable that the line will show a profit until extensions are built to develop districts where water competition will not prevail, particularly for the handling of freight. It appears that this is a district where elec-

trified lines would be much better adapted to serve the traffic, a large part of which, in any event, would be passenger business.

EQUIPMENT—ADMINISTRATION.

The track materials came mostly from American sources. The ties are Japanese hardwoods. The line was cheaply constructed, with a small amount of ballast.

Most of the rolling stock is of American manufacture.

The line is under the administration of a managing director general, Mr. Chong Hong Nam, who is located at Swatow. Mr. W. T. Ching is secretary. Purchases are made by the managing director general.

VI. CHINESE PROVINCIAL RAILWAYS.¹

INTRODUCTION.

The earlier railways whose construction was undertaken with Chinese capital were largely of the class that has been called provincial. These generally encountered financial difficulties of some sort in the course of time and have generally disappeared as provincial projects. Most of them have been taken over by the Ministry of Communications as Chinese Government Railways. The following are the only ones left, and it is unlikely that any provincial railways of any large importance will be undertaken in the future.

KIANGSI (NAN-SHAN) RAILWAY.

LOCATION AND EXTENT.

This line starts at the Yangtze River port of Kiukiang and runs in a southerly direction a distance of about 87 miles to Nanchang, at the mouth of the Kan River, at the head of steam navigation on Poyang Lake.

The extension of this line has been mentioned in connection with the Shanghai-Hangchow-Ningpo Railway (see p. 106).

HISTORICAL SURVEY.

This line was first projected in 1904. The funds were to be raised by native debenture subscriptions and by increasing the provincial salt tax. The project finally received official sanction, including permission from the Board of Commerce to raise capital by the issuance of lottery tickets. But these efforts resulted in building only part of the present line, and in 1912 resort was had to loans from the Japanese Bank of Taiwan, which finally made possible the completion of the present line of 87 miles. This Japanese loan has been much objected to by the local merchants and gentry who have interests in the project.

The construction was under the direction of Japanese engineers, and the first 20-mile section was opened for service in December, 1910. The line to Nanchang was opened the latter part of 1915, but with one bridge incomplete, where traffic had to be transferred. It is understood that the Japanese loan carries the right to finance any other extensions that can not be taken care of by native subscription.

TRAFFIC AND PROFITS.

No reliable data are obtainable regarding the traffic and revenues of this line, but from investigation on the ground it would seem that earnings depend on passenger traffic rather than freight business, and, as this line is paralleled throughout its entire length by the Poyang

¹ The Tsitsihar (Anganki) Light Railway is a typical Chinese provincial railway, but, on account of its being located in Manchuria and connected with the Chinese Eastern Railway, it is shown with the Manchurian group of railways on page 219.

Lake transportation lines, the conclusion seems warranted that profitable business will not develop until the line is extended, particularly as outlined in connection with the Shanghai-Hangchow-Ningpo Railway. No information was obtained as to actual official results, but it is understood that the line has shown no net profit to date.

EQUIPMENT AND PURCHASES.

The roadway and track materials are almost entirely from Chinese, Japanese, and American sources—largely the last-named.

All the locomotives and a large part of the passenger and freight cars are of American manufacture.

The head office of this railway is at Kiukiang, and the present staff is partly Chinese and partly Japanese. Considerable preference is probably given at the present time to material from Japanese sources.

NANKING CITY RAILWAY.

LOCATION AND EXTENT.

This is what might be considered a heavy steam tramway using ordinary steam-railway equipment. It starts on the bank of the Yangtze River near the landing hulks of the Yangtze River lines and not far from the Nanking terminal passenger station of the Shanghai-Nanking Railway. It runs a distance of about 8 miles to the center of the Chinese city of Nanking, which at one time was the capital of the Chinese Empire.

The greater part of the line is inside the walled city. It passes through the wall at a point less than 2 miles from the terminal on the bank of the Yangtze River.

HISTORY.

Mr. Tuan Fang, then viceroy of the Liang Kiang Provinces, built the line out of provincial funds, and it has been known as the "Viceroy's Railway." The line was first opened for traffic in August, 1908. Mr. Leeme (British) was the engineer in charge of construction. The gauge of the track is 4 feet 8½ inches.

EQUIPMENT AND TRAFFIC.

The roadway and track materials seem to have come from various sources, but a considerable amount is of American manufacture. This line has only a small amount of rolling stock. The two locomotives are of American manufacture. The freight and passenger cars were formerly used on the Woosung branch of the Shanghai-Nanking Railway before this branch was taken over by the present administration. This equipment was refitted with Janney couplers and Westinghouse air brakes. When the writer inspected the line only one engine was in service; the other was undergoing badly needed repairs. The rolling stock was in a more or less run-down condition, as was the track also.

The traffic is mostly passenger business, and during the recent political troubles the use of the line has been largely monopolized by the provincial military authorities. It is understood that the line does not meet operating expenses—to say nothing of showing any profit—and this condition has prevailed for some time.

VII. CHINESE INDUSTRIAL RAILWAYS.

INTRODUCTION.

The following account does not attempt to cover all the short industrial railways that may exist in China at present. In the case of those mentioned, the information was obtained chiefly in connection with the industries that the lines serve. In each instance the lines discussed may in time come to assume much more importance than they possess at present, on account of the probable growth of the industries served and the fact that in the future such concerns will probably be required to provide most, if not all, of their industrial-railway facilities.

The prediction seems justified that, in the future railway development of China, the Ministry of Communications will largely direct, if not entirely control, the construction and operation of all commercial railways, although, in conformity with the present policy, branch railways may be occasionally built and in some instances operated by provincial or private interests. But it will be only a question of time until the control of all commercial railways will pass to the Ministry of Communications. It is felt, however, not only that industrial railways such as the following will be under the control of the industries served, but also that there will be a growing tendency to force the industries to build their own railways—including, in special instances, branches of considerable length.

TAYEH RAILWAY (HAN-YEH-PING CO.).

LOCATION AND OWNERSHIP.

This is a railway of 2-foot gauge, from the ore-shipping port of Hwangchow on the Yangtze River to the Sztse-Shan and Tieh-Shan mines, generally known as the Tayeh iron deposits. The present line is 17 miles in length, with a considerable amount of tracks at each terminal, particularly at the mines. The Han-Yeh-Ping interests are in charge of these operations, although the mines are supposedly worked for the Chinese Government. The writer was unable to ascertain the details of the arrangement. The products of these mines are depended upon entirely for the operations of the Han-Yeh-Ping Iron and Steel Works at Hanyang (Hankow); a considerable amount of the ore goes to the Japanese Imperial Steel Works at the port of Wakamatsu near Moji; and there are in course of construction two 400-ton blast furnaces on the Yangtze River near the present terminal of this line, which will also depend on these ores.

TRAFFIC AND EQUIPMENT.

The traffic of this line consists almost entirely in the handling of these ores; it is very heavy for this 2-foot-gauge railway, with its present small equipment. A number of the locomotives and some of the other rolling stock are of American manufacture, but most of

this equipment has been in service for a number of years and is now more or less obsolete, considering the advance in recent years in industrial railway equipment for the handling of iron ores. It seems probable that this railway will have to be largely rebuilt and a considerable amount of additional equipment provided to handle this growing, important traffic.

MANAGEMENT.

The line is under the management of a superintendent, Mr. C. Y. Wang (Chinese). Several members of the technical staff are Japanese. The chairman of the Han-Yeh-Ping interests is Mr. Sun Pao Chi, and the general business manager is Mr. Wong Kokshan, both of whom are located in the company's Shanghai office at 36 Szechwan Road. Mr. Wong Kokshan has general direction of all purchases for the Han-Yeh-Ping interests, which include the Tayeh iron mines, the Pinghsiang coal mines, and the iron and steel plant at Hanyang (Hankow). Mr. S. O'Hara, Grosvenor Mansions, 76 Victoria Street, Westminster, London, S. W., is resident agent in England for these interests.

KAILAN MINING ADMINISTRATION RAILWAYS (KAIPING COAL FIELD).

LOCATION.

These are branches of 4-foot 8½-inch gauge, connecting the mines and works of the Kailan Mining Administration with the Peking-Mukden Railway where the latter passes through the Kaiping Basin, which lies between the stations of Tangshan and Kuyeh, 168 and 183 miles, respectively, northeast of Tientsin. These branch railways are used entirely for the handling of this concern's products.

The Kaiping Basin covers an area of about 95 square miles and is intersected by the Peking-Mukden Railway at the above points. The coal of the "Permo-Carboniferous" beds is deposited in some 13 seams, with a total thickness of from 40 to 60 feet at the Tangshan shafts in the southwestern part of the basin, 60 to 80 feet at the Machiako, 80 to 90 feet at the Chaokochwang shafts in the southwest-central and north-central parts of the basin, and 40 to 50 feet at the Linsi shaft in the northeastern part of the basin. The proving has shown that there are about 1,000,000,000 tons of coal in this mining concession. These coal deposits are underlaid with seams of good fire clay.

HISTORICAL SURVEY.

The coal and fire-clay outcrops of the Kaiping Basin have no doubt been known and worked by Chinese methods for several thousand years. The present administration came into existence July 1, 1912, by the amalgamation of the Chinese Engineering & Mining Co. (Ltd.), a British company registered in London, and the more recent native concern known as the Lanchow Mining Co. This combination has a share capital of £2,000,000 and, in addition, an issue of £1,200,000 of 6 per cent debentures. As already mentioned, the Tangshan mine was first opened in 1878 in connection with the mule tramway, 7 miles long, that was later extended until it became the Peking-Mukden Railway system. This is the oldest mine in China using modern methods. The Machiako mine represented the first operation of the Lanchow Mining Co. There are now five sets of mining operations, with the following daily capacity: Tangshan,

2,200 tons (of 2,240 pounds); Tangshan North West, 800 tons; Machiako, 2,500 tons; Chaokochwang, 2,500 tons; Linsi, 2,500 tons; total capacity, 10,500 tons.

OUTPUT OF MINES—NUMBER OF EMPLOYEES.

The annual output of these mines is about 3,250,000 long tons of reasonably good bituminous coal, of which about 100,000 tons are at present converted into coke. This concern also produces a very considerable quantity of fire bricks, floor tiles, glazed tiles, stone piping, and similar fire-clay products. It appears proper to mention in this connection that the works of the Chee Hsing Cement Co. (Ltd.) are located in the Kaiping Basin near Tangshan.

The total number of employees in the administration mines is about 25,000, of which 14,000 are underground workers, 6,000 overground, 1,000 in the fire-clay works, and 2,500 at the docks (particularly at Chinwangtao)—leaving about 1,500 miscellaneous employees.

MANAGEMENT.

Mr. Yuan Ke Fung is director-general of the administration. Maj. S. W. Nathan, R. E., is general manager in general charge of all departments. The head Chinese office is in Meadow Road, Tientsin. Mr. A. Docquier, located at Tangshan, is engineer-in-chief and directly in charge of operations in the field.

EXTENSIONS AND IMPROVEMENTS.

The writer learned from authoritative sources that this concern contemplates the expenditure of about £2,000,000 after the end of the war, in extensions and improved by-product methods. The future prospects of this project seem very bright, and one appears entirely warranted in saying that, with the large deposits of reasonably good coal controlled by this concession, the short railway haul (averaging a little more than 75 miles) to the ice-free port of Chinwangtao, the very large markets easily reached by ocean shipping, and the ample supply of robust labor in the district, this concern should find a ready market for any increased production. These conditions seem to point to large profits in the future, justifying this very considerable expenditure in extensions and improvements.

TAI-TSAO RAILWAY (CHING HSING COAL CO.).

This line is located in the southern part of the Province of Shantung, connecting the coal mines north of Yihsien with the Grand Canal. Connections are also made with the Tientsin-Pukow Railway. There are about 27 miles of railway, of 4-foot 8½-inch gauge, and the concern has a large coal yard and wharf at its terminal on the Grand Canal.

All materials and equipment are of German manufacture. The head office is at No. 8 Taku Road, Tientsin. Mr. C. von Hanneken and Mr. Hsu Shi Kang were the directors of this enterprise before China entered the war. All the other officials were Germans, and it is understood that the enterprise was largely financed with German capital, though there were supposed to be a number of Chinese shareholders.

So far as can be learned, no extensions or improvements are contemplated. It was impossible to get definite information regarding the probable future of this development.

VIII. FOREIGN-CONCESSION RAILWAYS.

INTRODUCTION.

Five different railways come under the above classification, as shown by the table on page 43. The British section of the Canton-Kowloon Railway has already been covered (see p. 116). The Chinese Eastern Railway and the South Manchuria system, both of which are in Manchuria, will be included in the discussion of the Manchurian group of railways. This leaves the French Indo-China line from Haiphong to Yunnanfu (287 miles of which is in the Chinese Province of Yunnan) and the Shantung (Santo) Railway, through the Province of Shantung, formerly a German line but now under the control and management of the Japanese.

As already stated, these concessions, with the exception of the Canton-Kowloon, were exacted from China during the "Battle for Concessions," the lines were built with foreign funds, and they have been operated entirely in the interest of the foreign countries concerned. In all instances except that of the Canton-Kowloon the concessionaires have claimed the right to investigate and develop the resources of the regions traversed by the railways, particularly coal and other mineral deposits.

YUNNAN (TIEN-YUEH) RAILWAY.

LOCATION AND EXTENT.

This line is located in Yunnan, one of the southwestern Provinces of China, lying next to Indo-China. This railway crosses the Tongking border at Laokai and runs in a northwesterly direction to Yunnanfu, the capital of Yunnan, a distance of 287 miles. The section of the line in French territory starts at the seaport of Haiphong and runs in a northwesterly direction through Hanoi, the capital of Tongking, to Laokai, a distance of 248 miles, making the total length of the lines 535 miles. There are no branches in Chinese territory.

HISTORICAL SURVEY.

The history of the Chinese section of the Yunnan Railway is closely connected with that of the French Railway in Tongking. The first railway in Tongking was of 60-centimeter (23.56-inch) gauge, and extended from Langson on the Kwangsi-Tongking border to Phulangthuong (Kent's "Railway Enterprise in China"). This line was later changed to meter gauge when extended to Hanoi. It is now the Hanoi-Langson section of the French Indo-China Railways and is the line that has been suggested to extend to Lungchowfu and from this point to Nanning, the capital of the Province of Kwangsi. The first step toward the present meter-gauge lines was taken in the latter part of 1897 by M. Doumer, the new Governor General, who had assumed his duties in the early part of that year. He submitted to the Conseil Supérieure of Indo-China a scheme involving the construction of some 2,000 miles of line, which was

approved by that body after being passed upon by a commission. M. Doumer next secured the passage of a law by the French Chamber in 1898 authorizing the construction of this system of railways.

In the meantime steps had been taken with the Chinese authorities to secure the necessary concessions. As a result, one of the features of the "Battle for Concessions" was that in April, 1898, China by convention granted this and other concessions to France. Mr. Kent, in his "Railway Enterprise in China," states the terms as follows:

- (1) Kwangchauwan to be leased to France as a coaling station.
- (2) The right to be granted to France to construct a railway to Yunnanfu from the Tongking frontier.
- (3) A promise to be given by France not to alienate any territory in the three Provinces of Kwangtung, Kwangsi, and Yunnan, which border on the French frontier.
- (4) The Chinese Government to agree that if ever it constitutes a postal department independent of the Maritime Customs, and if a European is to be appointed as director thereof, France shall have an equal right with that of other Powers to nominate a candidate for the post of director. (NOTE.—The present director general of the Chinese Post Office is now a Frenchman.)

In addition, the Chinese subsequently granted the concession for the building of a line from Lungchow, and the French have advanced claims at various times that this concession also gives them the right to extend this line to Nanning, the capital of the Province of Kwangsi. The building of the Laokai-Yunnan section and the operation of the entire line from Haiphong to Yunnan was given by the French Government to a syndicate of the principal financial houses in Paris, who organized the *Compagnie Française des Chemins de Fer de l'Indo-Chine et du Yunnan*, and this company in turn sublet the construction work to the *Société de Construction des Chemins de Fer Indo-Chinois*. The final agreement with the Chinese authorities was concluded in the fall of 1903. Mr. Hsu says regarding this situation:

The Chinese Government has no further obligation than to surrender the necessary land for the line and its dependencies. The gauge of the line is to be 1 meter. Once the line be completed, and if the parties concerned deem it expedient, after an understanding has been arrived at between the high provincial authorities on the one side and the French minister and the Waiwupu on the other, as to the mode of procedure, branch lines connecting with the main line may be constructed. All supplies, machinery, and materials necessary for the construction and exploitation of the railroad shall be exempted from import duty. In case of war with other nations and the railroad not maintaining its neutrality, China may take over the line and operate it, if she thinks fit. On the expiration of 18 years after the date of signing the agreement the Chinese Government has the right to get back the land granted and to repurchase the line from the French Government after the payment of all expenses put into the railroad, including stocks, interest and principal of bonds, and all properties in connection with the railroad.

This concession runs for 80 years, at the expiration of which time the line is to revert to the Chinese Government. The line was constructed entirely with French capital and is now controlled and operated by the French. Initial work was undertaken at Laokai in 1899, but the natives objected and obstructed progress by causing considerable disturbances. Next the Boxer uprising suspended all work until 1901. It was then decided to complete first the line from Hanoi to Taokai. This was done, and then the construction of the Chinese section was taken in hand, but the line to Yunnanfu was not finally completed and put in service until April, 1910.

The construction of the Chinese section was very difficult and expensive. Many unusual obstacles were encountered; one was the scar-

city of labor in this part of China capable of doing railway construction work, and another was the fever-ridden country through which part of the railway runs. It is stated that the number of coolies who died on the construction work was about 40,000. On one stretch of about 50 miles there is a climb of approximately 4,800 feet, thus approximating a 2 per cent grade for 50 miles. The highest point on the line is about 6,625 feet above sea level. On the Chinese section there are 147 tunnels, the longest being 2,112 feet. On this same section there are 47 bridges of more than 65-foot span.

EXTENSIONS CONTEMPLATED.

This line being in the area claimed as their "sphere of influence," the French assert the exclusive right to finance and construct all the railways that the Chinese can not build with native funds. As already mentioned, the Chinese admit the granting of the concession to extend the Hanoi-Langson line to Lungchow, and the French insist that, in addition, this concession gives them the right to extend this line to Nanning. The French also claim the right to extend the Laokai-Yunnan section to Hsuechow on the Yangtze River and from there to Chengtu, the capital of the very important Province of Szechwan—also to construct another line paralleling the Yangtze River from Hsuechow to Chungking, where connection would be made with the Hankow-Szechwan line at a point something more than 150 miles southeast of Chengtu. A reconnaissance has been made of the route for the extension of the Laokai-Yunnan section to Hsuechow.

MATERIALS AND EQUIPMENT.

Practically all roadway and track materials on this system are from French sources; the weight of the rail is 25 kilos per meter (50.3 pounds per yard). Tie-plates and screw spikes have been used for the greater part of the construction. A considerable number of steel ties of robust design have been used; these are shown in figure 15 (see general subject of ties, p. 73). White ants are very destructive in parts of this territory. The rolling stock also is practically all of French design and manufacture. One notable exception to this, however, was the purchase of three locomotives from the Japanese shops of the South Manchuria Railway Co. at Shakako (Dairen). These three locomotives were designed, as well as manufactured, at those works.

MANAGEMENT AND PURCHASES.

The general administration of the entire Tongking Railway system, including the Chinese section, comes under the jurisdiction of M. Louis Constantin, *Inspecteur Général des Travaux Publics de l'Indo-Chine*. The direct administration and operation of the Chinese section is under the jurisdiction of a French official, whose title is director and engineer-in-chief.

Purchases for the entire system are in charge of M. Pierre Foursand, *Chef du Magasin Général*. All these officials are located at Hanoi, the head office of the entire Indo-China system.

SHANTUNG (SANTO) RAILWAY.

LOCATION AND EXTENT.

This is the much discussed German railway through the Province of Shantung, now under the control of the Japanese. The line starts at the port of Tsingtau on the bay of Kiaochow and runs in a westerly direction to Tsinanfu, the capital of Shantung, a distance of about 245 miles. There track connection is made with the Tientsin-Pukow Railway, although the terminal facilities are entirely separate, as shown by the photographs of the terminal stations (figs. 3 and 4). There are more than 25 branches, built to reach the Poshan coal mines; these branches connect with the main line about 150 miles from Tsingtau.

HISTORICAL SURVEY.

The ostensible cause for the German occupation of Kiaochow Bay November 14, 1897, was the murder of two German missionaries early that month in the Province of Shantung. In view of events that have since occurred it would appear that the German occupation was deliberately planned and that the occurrence mentioned was only a pretext. The Germans promptly followed the occupation by demands on the Chinese Imperial Government at Peking, which were vigorously followed up and, in fact, added to from time to time, with the result that a lease was signed March 6, 1898, for Kiaochow Bay and a definite land area (about 200 square miles) that included the present port and city of Tsingtau. At the same time a convention was concluded for the building of the present Shantung Railway and, in addition, provision was made for the building of two other lines—one from a junction near Kiaochow to Ichowfu and the second to complete the triangle to Tsinanfu on about the route of the present Tientsin-Pukow line. The concession included also the right to furnish the capital for all railways in Shantung that could not be financed from native sources. The provision with regard to this last matter is given as follows by Mr. Hsu in his "Railway Problems in China":

If at any time the Chinese should form schemes for the development of Shantung, for the execution of which it is necessary to obtain foreign capital, the Chinese Government, or whatever Chinese may be interested in such schemes, shall, in the first instance, apply to German capitalists. Application shall also be made to German manufacturers for the necessary machinery and materials before the manufacturers of any other Power are approached. Should German capitalists or manufacturers decline to take up the business, the Chinese shall then be at liberty to obtain money and materials from sources of other nationality than German.

There was keen competition among the German financial interests to obtain the concession from the German Government to build these lines, with the result that a combination of German financial houses was effected, and in June, 1889, the Schantung Eisenbahn Gesellschaft secured the concession to build the line with "joint Chinese and German capital." Probably not a single subscriber was Chinese. The capital used in the construction of this line and also in the development of the resources along the line has been very largely, if not entirely, German. This was also the case with the improvements such as the port and city of Tsingtau and the new part of the town of Tsinanfu at the western terminal. The above concession also carried the right, after the end of 1908, to build the line from the junction at Kiaochow to Ichowfu. In addition, the exclusive right to prove

and claim the mineral resources for future development of the railway zone (consisting of a strip extending for about 10 miles on each side of the center line of the railway) was granted this syndicate. Work on the Shantung Railway was started promptly and the line was completed and put in service in 1904. The cost approached \$50,000 (gold) per mile of line.

Giving due weight to the reasons that have been advanced by various authorities for the German seizure and forcible occupation of this Chinese Province for their operations, the writer is convinced, after going over the ground, that one of the particular and very sound reasons from the German standpoint was that this action gave the Germans control of a large number of the most robust and upstanding natives in China, capable of standing, and willing to do, hard work. In addition, this is one of the most healthful parts of China, and Tsingtau is probably the most pleasant place of residence, all the year round, on the entire Chinese coast.

THE PORT OF TSINGTAU.

One of the most important and interesting of the German developments in Shantung was the very completely equipped and well-arranged facilities at the port of Tsingtau. The area of the protected harbor of Kiaochow Bay is approximately 200 square miles, in addition to the 200 square miles of so-called leased territory. The port facilities consist of a large basin and several slips for seagoing vessels of all drafts up to 35 feet and a smaller basin for native craft. The construction is of the most substantial and permanent character. The slip between the two principal piers is capable of berthing the largest vessel in any service in the world to-day or likely to be built in the next generation. One of the disadvantages of the harbor is the height of the tides, which is very considerable and causes currents rather troublesome for the navigation of large vessels through the somewhat crooked entrance of Kiaochow Bay.

One of the principal features of the port is a complete plant for the repair of ships. In this connection there was originally a large floating dry dock, but since the occupation by the Japanese this has been taken to Kobe and is now in use at that place in taking care of the repairs to Japanese shipping.

CLASS OF TRAFFIC.

The service on this line, particularly as regards passenger accommodations, is somewhat restricted under the present Japanese management. Even under normal conditions it is probable that the freight revenues will considerably exceed the passenger earnings, although a very substantial passenger business is now done, which could probably be increased by additional service. The freight business comprises a large amount of agricultural products, one of the most important of which is Chinese strawbraid. In 1915 the coal handled amounted to about 260,000 tons (of 2,240 lbs.); in 1916 there was an increase to about 445,000 tons; and, with the improvements contemplated by the Japanese, there will probably be a further increase, although this is not likely to affect the traffic materially until 1919.

PROFITS.

The writer was unofficially advised that the Japanese administration has concluded, as a result of its investigations, that the German

operating results were as follows (converted from German marks to United States currency at the rate of \$0.238 to the mark):

Years.	Earnings.	Expenses.	Profits.
1905.....	\$667,909	\$353,240	\$314,669
1906.....	1,136,248	408,682	727,566
1907.....	1,198,578	421,422	777,156
1908.....	1,105,531	342,570	762,964
1909.....	1,426,855	396,901	1,029,955
1910.....	1,627,199	434,983	1,191,740
1913.....	1,965,956	567,244	1,398,712

For 1911 and 1912 the earnings were \$3,496,000 Mex. and \$4,211,000 Mex., respectively, but expenses for these two years were not satisfactorily determined and are therefore not given. In 1915 and 1916 the results of the Japanese administration were shown in Japanese gold yen (yen = \$0.4985) as follows: Earnings, 3,651,400 yen and 4,437,100 yen, respectively; expenses, 3,242,200 yen and 2,937,300 yen. The earnings for the first six months of 1917 showed a small improvement over the first six months of 1916. These figures are shown as above for the reason that conversion to a common value would have to be made on an arbitrary basis, and in this way the figures would lose much of their significance to anyone familiar with the rates of exchange in the Far East during this period. They justify the conclusion that the financial results of this line under ordinary circumstances will be satisfactory. Notwithstanding the reduction of the traffic as a result of the war, the earnings shown represent a steady growth which, with the return of normal conditions, will doubtless be continued.

POSSIBLE EXTENSIONS.

What the disposition of this railway will be after the end of the war can not be predicted at this time. One of the present results is that until such time as a final conclusion is reached the Japanese claim succession to the German concessions in the Province of Shantung. So far as can be learned, no consideration has been given to the building of the line from Kiaochow to connect with the Tientsin-Pukow Railway near Ichowfu. However, there have been persistent rumors from time to time of Japanese efforts to secure concessions to extend the line west from Tsinanfu through western Shantung and southern Chihli to connect with the Peking-Hankow and also to reach the valuable deposits of good coal in southern Chihli, northern Honan, and southeastern Shansi.

The Far Eastern Review for December, 1917, stated that the Japanese Department of Agriculture and Commerce has set aside 10,000,000 yen, one of the purposes being to develop and work during 1918 and 1919 the mineral resources of Shantung, particularly the iron mines of Chinlingchin, about 180 miles west of Tsingtau. If a large amount of iron ore is developed, this will probably involve the construction of some additional branch lines.

ROADWAY AND TRACK MATERIALS.

The materials for this line are all of German standards and manufacture. There are more than 1,000 bridges of all spans, all of which

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FIGS. 28 AND 29.—FOUR-WHEEL GOODS CAR AND CABOOSE ON THE SHANTUNG RAILWAY.

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ROADWAY AND TRACK MATERIALS.

The materials for this line are all of German standards and manufacture. There are more than 1,000 bridges of all spans, all of which

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FIGS. 28 AND 29.—FOUR-WHEEL GOODS CAR AND CABOOSE ON THE SHANTUNG RAILWAY.



FIG. 30.—LOW-SIDE GONDOLA CAR ON THE SHANTUNG RAILWAY.



FIG. 31.—SPECIAL CAR FOR HANDLING BULK LIME ON THE SHANTUNG RAILWAY.

are designed for loading not in excess of Cooper E-35. These light bridges are handicapping the Japanese management in its desire to use heavier motive power. It will be exceedingly difficult, if not impracticable, to strengthen the present structures so as to carry substantially heavier loads. A steel tie of robust design, provided with substantial fastenings, has been used for all tracks and appears to have given entirely satisfactory results. The rail is a special German section for use on these steel ties; its weight is about 60 pounds, with, however, a head and girder strength probably equivalent to 70 pounds A. R. E. A. section. All the track materials are of typical German standard, and so far the Japanese have made little change in the way of renewals or additions—one reason being that there was a very considerable supply of most parts in stock when the Japanese assumed control.

As already mentioned, all the stations and other buildings on this line are of very substantial construction and in many cases of ornate design. All structures are permanent and adequate except as regards the loading capacity of the bridges, and also the turntables, which are not capable of turning heavier engines than those now in service.

ROLLING STOCK.

All the original rolling stock conforms in general to the German practice and came from German manufacturers. The present equipment consists of 53 locomotives (3 of which were recently furnished by an American locomotive company), 85 passenger cars, and 1,227 freight cars of all classes. In September, 1917, the Japanese management had under way negotiations for buying several additional American locomotives, but they were having serious difficulty in obtaining them.

Figures 28 and 29, facing page 132, show a typical covered four-wheel goods car and a caboose, part of which is used for handling package and express freight. An unusual feature of the caboose, from an American viewpoint, is the running board for the crew to go along the side of the car instead of over the top. Figure 30 shows a low-side gondola with the old-style buffers and safety chains, with the new automatic coupler of American manufacture installed by the Japanese since they took over operation of the line. The lower illustration on the same plate shows a special four-wheel car for handling bulk lime. The writer was very much impressed with the utility of this. It will be noticed that the side buffers on this car have been removed since the installation of the automatic couplers.

WORKSHOPS.

There are well-equipped shops of moderate size for the making of all classes of repairs to the rolling stock. These shops are located a short distance from the Tsingtau terminal. There are also ample engine houses and equipment facilities along the line, particularly at all engine terminals. One feature in this connection with which the writer was particularly impressed was the substantial and adequate water-station facilities provided.

ORGANIZATION AND MANAGEMENT.

Since the capitulation of the German garrison of Tsingtau in December, 1914, the operation of this railway has been under the adminis-

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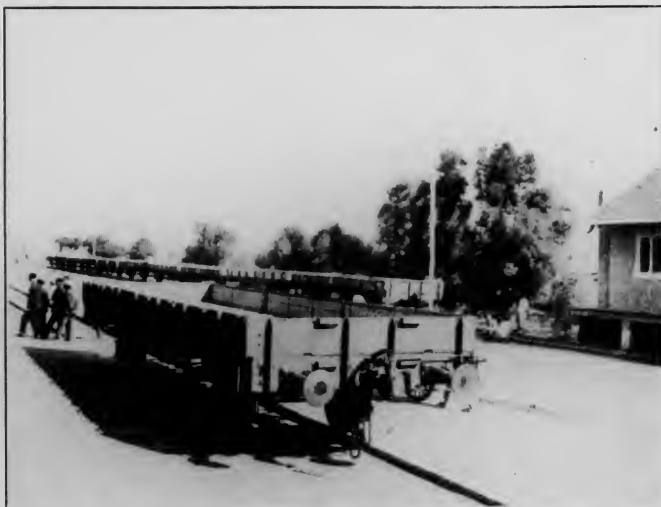


FIG. 30.—LOW-SIDE GONDOLA CAR ON THE SHANTUNG RAILWAY.



FIG. 31.—SPECIAL CAR FOR HANDLING BULK LIME ON THE SHANTUNG RAILWAY.

CHINA.

133

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tration of the Japanese military garrison of Tsingtau. October 1, 1917, the arrangement was modified by the institution of what was termed a Civil Administration of the Railway Department, which, however, is still under the general administration of the military authorities. This organization is very complete and deserves careful study from the standpoint of its thoroughness and comprehensiveness. Two points that merit particular attention are, first, the inclusion of the mining operations under the direction of the Railway Department; and, second, the provision of a "Bureau of Traffic Control." This latter represents a partial step toward the commercializing of the railway, but, as this bureau also has charge of the station-operating forces, it is not a distinctly separate branch, like the traffic department of our American railways. This organization, like that of the South Manchuria Railways (see p. 196), shows the careful and painstaking arrangements that the Japanese have taken to insure success. The following is a carefully made translation of the Japanese text of the military ordinance of October 1, 1917, putting into effect these regulations:

ARTICLE I. The following five bureaus shall be established in the Railway Department of the Department of Civil Administration in the Tsingtau Army headquarters and a chief shall be appointed in each bureau: Bureau of general affairs; traffic control; operation; engineering; finance.

ART. II. The bureau chiefs shall be appointed from railway secretaries or railway engineers, and they shall control their respective affairs, supervising their staffs under the direction of the Director of the Railway Department.

ART. III. The bureau of general affairs shall have charge of the following business: (1) Confidential matters; (2) personnel; (3) correspondence, compilation of rules, etc.; (4) investigations and statistics; (5) assignment of quarters; (6) training of employees; (7) leasing of houses and lands; (8) all matters not included in the functions of other bureaus.

ART. IV. The bureau of traffic control shall have charge of the following business: (1) Traffic on the railways; (2) distribution of cars; (3) warehousing.

ART. V. The bureau of operation shall have charge of the following business: (1) Operation of trains; (2) correspondence relating to operation; signaling; and conduct of railway.

ART. VI. The bureau of engineering shall have charge of the following business: (1) New construction and repairs, railway, and buildings; (2) operation of electric power houses for railway purposes; (3) control of lands and buildings in railway use.

ART. VII. The bureau of finance shall have charge of the following business: (1) Preparation of the budget and the settlement of accounts; (2) receipt and disbursement of cash and properties and custody thereof; (3) purchases of materials and disbursements in connection therewith; (4) inventories of properties.

ART. VIII. The wharf office shall be established within the Railway Department and shall have charge of the docking and clearing of vessels, the loading and unloading of cargo, and control of the wharves and properties connected therewith.

ART. IX. A workshop shall be established in the Railway Department and shall have charge of the designing of rolling stock and machinery and the construction and repairing thereof.

ART. X. The bureau of mines shall be established within the Railway Department. It shall be composed of three sections, (1) business, (2) excavation, and (3) sale, which shall have charge of such matters as underground work in the mines, allied manufacturing industries, sale of products, and control of the properties.

ART. XI. The details of the organization and operation of the different bureaus, the wharf office, the workshop, and the bureau of mines shall be determined by the director of the Railway Department with the sanction of the commander in chief of the Tsingtau garrison.

For a directory of the heads of these bureaus, see page 268.

PURCHASES.

From the above it will be noticed that a definite organization—a section of the financial bureau—has charge of the purchase and handling of stores. This is the usual Far Eastern arrangement. At present there is a decided tendency to purchase requirements wherever they can be secured to the best advantage. No doubt, however, this is only on account of present conditions; upon a return to normal conditions decided preference will probably be given to purchases from Japanese sources—at least as long as Japanese control of this railway is maintained.

IX. TRAMWAYS.

INTRODUCTION.

The name tramway is used in this report for the reason that this is the prevailing term for this class of railways in all parts of the Far East. The number of tramways in China is very small, there being only eight sets of lines altogether, including two in Manchuria. With one exception, all these are located, either partly or wholly, in foreign concessions. The exception is the tramway in the Chinese city of Shanghai, which has much of the characteristic environment of a foreign settlement. Of the two tramways in Manchuria, one is the Japanese tramway at Dairen, operated as a section of the South Manchuria Railway, and the other is a horse tramway, about 4 miles long, in the outside city and Japanese concession at Mukden. These will be referred to later in connection with the Manchurian group of railways.

Of the other six tramways, one is the system in the several concessions at Tientsin. The second, third, and fourth are the tramways in the municipal district of Shanghai, the French concession of Shanghai, and the native city of Shanghai. The fifth and sixth are the ordinary tramway at Hongkong and the Peak Line, also in Hongkong.

These several situations will be referred to in the above order, but in some cases very briefly, on account of the relatively small amount of time that the writer was able to devote to the subject of tramways. Practically all fares on the tramway systems in Tientsin and Shanghai are collected in the form of Chinese copper cents or "small" silver money (both of which are at a substantial discount) and converted to Mexican dollars at an average of about 130 copper cents to the dollar in Tientsin and about 125 copper cents to the dollar in Shanghai.

The riding on tramways, so far as they exist in China at present, is largely confined to the ordinary class of Chinese. Wealthy Chinese and foreigners of all classes are seldom seen in the street cars, but, as a rule, travel in jinrikishas or other conveyances. There has seemed to be a growing tendency recently on the part of the less well-to-do class of foreigners to ride in the tramway cars, particularly in Shanghai, but the proportion of foreign passengers on all lines is very small and practically all foreigners ride first class.

TIENTSIN TRAMWAYS.

The Tientsin tramways are operated by the Compagnie de Tramways et d'Eclairage de Tientsin, Société Anonyme, with headquarters in Brussels, Belgium. There are about 8.2 miles of this system, located in the French, Japanese, Russian, Italian, and Austrian settlements. Service was first established in 1906. The track is of meter gauge, and the rail is all grooved girder weighing 46 kilos per

meter (92.8 pounds per yard). One particularly interesting feature of the construction of this track is the fact that no ordinary ties (sleepers) are used, but that, instead, the girder rails are laid on beds of broken stone 15 inches deep and 18 inches wide. The rails are held together with 12 tie rods for each set of rails 18 meters (59 feet) long, or one tie rod for each 5 feet. These tie rods are very robust and securely fastened to the web of the rail. After having had this construction explained, the writer took particular notice of the line and surface of this track at different points and was much surprised at its good average condition, which seemed to confirm the statement of Mr. Gaillard (the general manager) with regard to the satisfactory results given by this construction.

The rolling stock consists of 64 double-motor trolley cars and 50 trailers, all of Belgian design and manufacture. Figures 32 and 33 show a motor trolley car and the ends of two trailers. This company also furnishes the electric power for Tientsin. The total capital is 6,250,000 francs (\$1,206,250 United States currency). This investment is about equally divided between the tramway and electric plants. The gross tramway earnings for 1915 amounted to 64,524,183 copper cents, which, reduced to Mex. dollars at an average of 130 cents to the dollar, made about \$496,800 Mex.

First-class and second-class fares are charged to men, but Chinese women are allowed to ride first-class by payment of second-class fare. The second-class passengers are handled almost entirely in the trailers. Practically all foreigners ride first-class when they ride at all. All rides are on a single-fare basis. Part of the lines have a 2-copper-cent fare, the maximum distance being 3 kilometers, or about 1.9 miles. On the other routes 3-copper-cent fares are charged for a maximum ride of 5 kilometers, or about 3.1 miles. One very interesting feature of this system is that the amount of travel varies with the character of the season and the day. On fair days the daily collection averages about 250,000 copper cents, but on wet, disagreeable days the collection sometimes falls below 100,000 copper cents. These figures seem to indicate that, notwithstanding the industrious habits of the Chinese, a very large part of the riding of these lines is for pleasure (or at least convenience) rather than travel to and from work.

This is purely a Belgian concern; all materials and equipment conform, in general, to Belgian practice and are usually of Belgian manufacture. A good many purchases are made from concerns in Tientsin, and at present requirements are bought from whatever source they can be secured; but, upon the return of normal conditions, no doubt preference will again be given to materials from Belgian sources when these are again available.

SHANGHAI TRAMWAYS.

The lines of the Shanghai Electric Construction Co. (Ltd.) are located in the foreign settlements (except the French) in Shanghai—or what is otherwise known as the International Settlement of Shanghai. The total length of the route is about 16.45 miles of rail lines and 1 mile of railless trolley.

All the tracks of this company are substantially constructed and well maintained. The rolling stock consists of 90 motored trolley

cars, 70 trailers, and 7 railless trolley cars. Part of the power is generated in the company's own powerhouse and part is purchased from outside.

The total share capital of the company is £320,000. For the year ended December 31, 1917, there was a net profit of £49,510 and, after the appropriation of £10,000 for renewals and £5,000 for writing down the preliminary expenses account, 10 per cent dividends were paid on the above share capital. These results show the possibilities of tramways in China where the developments are followed up from year to year by capable and enterprising management.

First and third class (no second-class) fares are charged, but Chinese women ride first-class on payment of third-class fare. There is an arrangement of zone fares, the first-class fare for each zone being 3 copper cents. When fares are collected passengers are given a special number and colored slip. There are frequent instances of "surprise" checking by special inspectors, as a part of a very carefully worked-out and maintained scheme to eliminate "squeeze," or "graft." It is claimed that this has been reduced to a very low point by the arrangement indicated.

There is at present a very successful and well organized railless trolley, with a route of a little more than a mile, running through a very congested district. The service was first established in 1915 over a route of about seven-tenths of a mile, and was extended in 1916 to the present length. This service was objected to at first by the municipal police authorities, who give a great deal of attention to keeping traffic moving in the congested districts of Shanghai; but as a result of the successful operation of this equipment their attitude has become favorable and the Municipal Council has been considering a proposal for a very considerable extension (about 9 miles) of this railless trolley service.

Figures 34 and 35 show two views of these railless trolley cars. In the statement presented to the municipal council the claim is made that these cars occupy an area of 158 square feet while 28 jinrikishas carrying the same number of passengers would occupy 2,500 square feet to permit of proper movement. This means, practically, that at least two of these railless trolley cars would have ample running space in one of these narrow streets and still permit the movement of other traffic, whereas the 28 jinrikishas would completely occupy the street without allowing other traffic to move. The average cost of the seven cars now in service was about \$12,850 Mex. for each complete equipment, and the actual cost of the present installation, including the double trolley, was \$137,575 Mex., which included a contribution of \$26,022 Mex. for street paving. As no additional land or buildings were added to the general plant, an arbitrary amount of \$10,000 Mex. was added for determining return on capital. The detailed working expenses have been very carefully watched, and the results for the last half of 1916 show a profit of about 15 per cent on the investment.

The tire renewals were estimated at \$0.03 Mex. per car mile, but have since been determined as less than \$0.024 Mex. The mileage for tires will average more than 25,000 per tire; the minimum so far has been 18,000 and the maximum almost 50,000 miles. The weight of the complete outfit (no load) is about 8,400 pounds. Motors are 20 horsepower and have been found ample. The power

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FIGS. 32 AND 33.—TRAMWAY CARS AND TRAILERS, TIENTSIN.

Notice pantograph contact.

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FIGS. 32 AND 33.—TRAMWAY CARS AND TRAILERS, TIENTSIN.

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FIGS. 34 AND 35.—RAILLESS TROLLEY CARS IN SHANGHAI.

consumption is about 0.8 of a kilowatt hour per mile. The cost of power is \$0.0308 Mex. per kilowatt hour. The electrical equipment and most of the materials for these seven cars were purchased in England and were erected under General Manager McColl's direction in Shanghai. This railless trolley system is the most successful installation of the kind that the writer ever investigated.

The management of this system is entirely British, and, while a good many of the requirements are purchased in Shanghai, preference is undoubtedly given to materials from British sources. A directory is given on page 268.

HONGKONG TRAMWAYS.

The Hongkong Tramways Co. (Ltd.) operates a system of well maintained and managed tramways extending from one end of the city of Victoria to the other, either on or near the water front. The city is stretched out for several miles on the island of Hongkong between the high ground and the harbor.

For the year 1917 the profits from operations, after liberal depreciation charges had been deducted, amounted to \$248,915 (gold). Debenture interest totaled only \$33,575, and \$33,585 was paid as an interim 9 per cent dividend, leaving the handsome amount of \$179,755. This was added to the previous surplus balance and made the total accumulated surplus balance \$261,050, from which it was proposed to pay an additional 3 per cent dividend, making a total of 12 per cent on the share stock.

During June, 1917, General Manager and Chief Engineer J. J. S. Kennedy made a visit to Japan to investigate the procurement of immediately needed supplies, but, so far as could be learned, he made no purchases other than those to meet the present running requirements. The occasion for this arrangement was the impossibility at that time of supplying these requirements from any other source.

A directory of the officials of this system is given on page 268.

PEAK TRAMWAYS.

The Peak Tramways at Hongkong are what would be called, around Pittsburgh, an "incline." The service rendered is the conveying of passengers by cable incline lift from a station near the foot of the slopes to a point a considerable distance up on the higher ground, the highest point of which is known as the Peak. The Peak is about 2,600 feet above sea level, and in this district there are many residences and a large hotel.

The management of this concern is strictly British. A directory is given on page 269.

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FIGS. 34 AND 35.—RAILLESS TROLLEY CARS IN SHANGHAI.

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Part 2.—JAPAN.

INTRODUCTION.

The Japanese railways are taken up in this place, instead of the Korean and the Manchurian, on account of the Japanese control of the Korean railways and also of all the Manchurian railways except the Chinese Eastern and the Tsitsihar Light Railway. This statement is intended to cover the Kirin-Changchun and the Ssupingkai-Chengchiatun lines, nominally Chinese Government railways but actually under Japanese control and management.

While American manufacturers have in the past furnished the Japanese railways—both in Japan proper and in Korea and South Manchuria—with a very considerable amount of railway materials, equipment, and supplies, it is the writer's opinion that, in the future, while the United States will continue to supply all these lines with a very substantial share of their requirements, this will be entirely because of the elements of cheapness, maximum convenience in purchasing, and, in certain cases, superior quality. The business will be transacted very largely, however, through Japanese concerns with highly organized branches in this country. A considerable part of the profit will thus go to Japanese interests, even to the extent of the shipments going in Japanese bottoms. Not only will Japanese railways be our customers only when it is most convenient for them to so arrange their purchases, but State-aided Japanese manufacturers of railway materials and equipment, in Japan proper and South Manchuria and possibly parts of China, will be active competitors. They will be assisted in their efforts by their cheap supply of labor and cheap sources of materials.

At this point it seems proper to quote from the annual report of the Imperial Government Railways of Japan for the year ended March 31, 1915, which states as follows:

SHRINKAGE OF FOREIGN PURCHASE.

The attention of the authorities had long been directed to the importance of superseding imports by home products. Apart from the growth of domestic industry which has gradually come to meet the multifarious requirements of railways, the policy of self-sufficiency had recently begun to recommend itself with greater urgency than ever in view of the conditions surrounding Japanese finance and economy in general. The best endeavors have therefore been used in this particular direction, with the result that the amount of foreign purchase has markedly been decreased.

The table following shows foreign purchases by the Imperial Government Railways for the years ended March 31, from 1911 to 1917, inclusive.

Years.	Home purchases.	Foreign purchases.	Total.	Proportion of foreign purchases to total.
				<i>Per cent.</i>
1910-11.....	\$13,904,009	\$3,252,033	\$17,216,042	18.9
1911-12.....	16,805,080	3,649,118	20,454,198	17.8
1912-13.....	18,071,301	3,025,638	21,096,939	14.3
1913-14.....	15,030,057	1,444,387	16,474,444	8.8
1914-15.....	18,993,084	804,991	19,798,075	4.1
1915-16.....	17,168,784	1,604,578	18,773,362	8.5
1916-17.....	18,955,858	2,595,214	21,551,072	12.4

The principal items purchased in 1914-15 were as follows: Wheels and axles for vehicles, \$273,635; finished steel girders, \$138,346; electric machines and materials, \$104,036; copper wire and No. 8 galvanized wires, \$69,332; finished springs, \$53,795; tires for vehicles and locomotives, \$40,780; iron and steel, \$34,373; tools and machines, \$23,377. In 1915-16 the four largest items were: Steel girders, \$1,049,695; iron and steel, \$176,835; galvanized iron wire and copper wire, \$158,075; fabrics, \$55,340.

In view of the conditions indicated above, the purpose of this report will be not so much to point out the possibilities of new railway markets in Japan as to suggest steps to retain past and present markets and also, in connection with Japan and Manchuria, to point out the possibilities of the competition which, in the writer's opinion, may be expected in the future in the other markets of the Far East. In a way these points appear to interest principally the large concerns that have done most of the business in the past, some of which have now established connections with the type of Japanese firms mentioned—such arrangements providing that for a portion of the business, at least, the American manufacturer gets a fixed (and probably small) profit while the Japanese concern gets a similar profit and also, at times, a much larger additional profit.

It does not seem that the situation as a whole warrants a very extensive analysis of the Japanese railways, but rather the presentation of such information as will enable anyone unfamiliar with the situation to acquire a general understanding of it. In this connection, however, it may be stated that from many standpoints the performance records of the Japanese railways are very interesting. In some respects the performances compare favorably with those of the American and German railways, which admittedly make the best showing, in their respective classes, of any railways in the world.

I. GENERAL INFORMATION.

In view of the many accounts of the Japanese situation in recent years, it seems unnecessary in this report to make extended reference other than to matters affecting transportation in general and the railways in particular.

GEOGRAPHICAL LOCATION AND AREA.

Japan proper, to which this report refers (Formosa and Saghalien not being included), is an island empire consisting of four principal islands—Honshu, Hokkaido, Kyushu, and Shikoku, these being given in the order of their areas. These and more than 500 other smaller islands constitute a total area of about 147,700 square miles, or about 8,000 square miles less than the land area of the State of California, the second largest American State, and only 700 square miles more than the total area of Montana, the third largest State. However, the total area of the four main islands on which all of the railways are located is only 129,250 square miles. These islands lie between 31° and 35.5° north latitude and between 124° and 146° east longitude.

POPULATION.

Authorities seem to agree that the present total population of Japan proper is now somewhat in excess of 55,000,000, or about 370 people per square mile, which is 11 times the density of the present population of the United States. There is, moreover, a large percentage of the land in Japan on which nobody lives, and this increases the actual density of the inhabited regions. The statistics of the Imperial Government Railways for the year ended March 31, 1917, give the population of the four islands on which all the railways are located as 55,224,500—almost 430 to a square mile, or a population of about 9,430 for each mile of railways of all classes, including tramways. When one considers that there is a population of only 345 for each mile of steam railways alone in the United States, one appreciates the small amount of railways in Japan per capita or, to state the situation more accurately, the large population per mile of railway.

CLIMATE.

The climate of Japan is mild, on the whole, as it is influenced by warm ocean currents. The entire country receives ample and very dependable rainfall, but at certain seasons very serious storms are likely to occur which at times cause much damage to crops, railways, and highways. Construction to prevent damage by storms has been among the elements entering into the high cost of building the Japanese railways.

AGRICULTURE AND PASTORAL PURSUITS.

The Japan Year Book for 1917 estimates that more than 75 per cent of the entire population is occupied in agricultural pursuits. It is estimated that one person cultivates half an acre and that there are five productive persons per family, making the average farm in Japan $2\frac{1}{2}$ acres; even in the northern parts of the main islands, where the largest farms occur, the average is not more than $7\frac{1}{2}$ acres per family.

Rice is a crop of first importance, with barley and wheat next. During the last seven years the average crop of rice has approximated 265,000,000 bushels, barley 50,000,000 bushels, and wheat 25,000,000 bushels.

Pastoral pursuits in Japan are inconsiderable.

MINERAL PRODUCTION.

COAL.

Coal is one of Japan's most valuable and dependable resources. Trade Commissioner J. Morgan Clements, in his report on the mineral resources of Japan, gives the available reserves of all classes of coal in Japan as about 8,000,000,000 metric tons, of which a very large percentage is bituminous. The largest deposits are on the island of Kyushu and those next in importance on the island of Hokkaido. The production for 1915 was about 22,700,000 short tons and for 1916 about 25,350,000 short tons. On account of the shortage of labor, this production does not seem (from preliminary information) to have been maintained in 1917 and probably will not be equalled in 1918. More than 75 per cent of the present production is from the Kyushu fields. A considerable part of this is from mines with modern equipment, but there are still a number of mines worked by primitive Japanese methods. Future railway construction will be little affected by the coal traffic except, probably, for the building of some additional mileage on the North Island.

IRON.

The question of an adequate supply of iron and steel is Japan's greatest industrial problem for future solution. Mr. Clements gives the probable consumption of iron and steel for 1917 as 1,350,000 tons, and it is estimated that this will probably be increased to as much as 2,000,000 tons in 1920. During 1917 it is hardly likely that the total production of iron under Japanese control, including that from Chosen, Manchuria, and China, exceeded 750,000 tons, leaving 600,000 tons to come from other sources—principally America. Japan is undoubtedly making a very careful study of future supplies not only of iron, but of coal as well, from Chosen, Manchuria, and China. The figures given by Mr. Clements show only about 18,000,000 tons of known iron deposits (estimated) and only about 45,000,000 tons of other possible deposits.

COPPER AND OTHER MINERALS.

In recent years Japan's copper production and its value have both increased very largely. Mr. Clements gives the production in 1915 as nearly 166,000,000 pounds, valued at \$26,700,000 gold. In 1916

the production was increased to more than 221,000,000 pounds, and the value increased to more than \$54,700,000 gold.

It is not probable, however, that the production of copper or any of the other minerals will in the future have any substantial effect on the building of additional railways or the traffic for the present lines.

GENERAL MANUFACTURING.

As is doubtless known by anyone interested in reading this report, manufacturing of many kinds has made rapid progress in Japan in recent years, particularly since the beginning of the war. As the result of his investigation, the writer was impressed in both Australia and Japan by the fundamental differences between those countries and the United States with respect to the manufacturing of railway equipment. The principal elements of divergence are the private ownership of the railways in the United States and the enterprise of railway-equipment factories that depend solely on private initiative and capital.

The situation in Japan is interesting and instructive and is very well covered by Dr. Toshiharu Watarai, formerly assistant councilor in the Imperial Board of Railways of Japan, in his Columbia University study entitled "Nationalization of Railways in Japan," where in the preface he makes the following statement:

Although most economic problems can in general not be considered apart from other discussions, the problem of railway nationalization is a particularly difficult one in that it ought to be discussed with equal care from the point of view of state policy and national defense, as well as from that of economics. * * * What, then, are the economic conditions in Japan? In my opinion, there are two great intellectual and physical obstacles in Japan which have hitherto hindered the development of its economic life. They are the lack of the individualistic idea (or independent spirit) of the people and the lack of capital. The Japanese people, who were for a long time under the idealistic-stoic influence of Buddhism and Confucianism, as well as subjected to the despotic pressure of the feudal system, have a very weak independent emotion, so that the economic life of the nation has naturally been depressed to a low level. Under such conditions the state-socialistic idea spreads rapidly among the people. This is shown by the fact that most of the great industries in Japan have been started or aided by the Government. The reader of this dissertation will realize that the nationalization of the railways in Japan was effected under such political and economic circumstances. Our effort must, therefore, be to remedy these defects. We can see that conditions in Japan—especially in the two points mentioned—contrast strongly with those in the United States.

These remarks no doubt apply to the Japanese manufacturing situation in general as well as to the railways in particular.

MANUFACTURING OF RAILWAY EQUIPMENT.

While the Imperial Government Railways of Japan have a number of extensive workshops reasonably well equipped with modern machinery, the general function of these workshops is to handle repairs to all classes of equipment and materials rather than to carry out extensive manufacturing, although a relatively small number of cars, particularly good wagons, are manufactured in several of them. Most of the manufacturing of rolling stock, however, is carried out by concerns under fostering contracts from the railways. The Imperial Steel Works at the port of Wakamatsu (near Moji), on the Island of Kyushu, nominally supplies the iron and steel required by

the Japanese railways, but at times, particularly since the beginning of the war, it has been found convenient to buy a good deal of the iron and steel elsewhere, especially in the United States. Without question, the above-mentioned steel works can not be considered a really private enterprise, and, while possibly not directly a Government plant, it has been as fully protected in its development as though actually under Government control and management. The Kisha Seizo Kaisha, with works at Osaka and Tokyo, is the largest manufacturer of locomotives and cars, and the Kawasaki Dock Yards at Kobe are the next largest manufacturers of railway equipment; this latter company's production consists largely of locomotives, though both companies produce, at times, a considerable amount of structural materials. At the time the writer was in Japan these two concerns had orders totaling 152 locomotives for the Government railways. In addition, they had contracts for a number of locomotives for the private and light railways. There are also a number of smaller concerns manufacturing cars—particularly goods wagons and tramway cars—for the Government railways and the private railways, light railways, and tramways. All these concerns have been or are being developed by fostering contracts from the railways, as indicated above by Mr. Watarai.

II. COMMERCIAL AND INDUSTRIAL CONDITIONS.

DOMESTIC COMMERCE.

While the amount per capita of domestic commerce is small, yet for the amount of railways it is very considerable and consists of a great variety of articles, many of which are agricultural products. Shipments constitute, for the most part, what would be termed in the United States "classified business." The only portion that is handled on a commodity basis is the coal traffic, which amounts to more than 50 per cent of all the tonnage handled. The average haul in 1916-17 was 99.3 miles, representing a gradual increase from 84 miles in 1913-14.

EXPORTS AND IMPORTS.

As probably everybody knows who will be interested in this report, both the exports and the imports of Japan have grown rapidly in the last few years, particularly since the beginning of the war. As a result, the amount of business offered has been entirely beyond the capacity of the railways to handle satisfactorily. This has been especially true of the freight traffic, which in many instances has been badly congested, particularly at the principal ports and in the industrial districts of Osaka-Kobe, Yokohama-Tokyo, and Moji. The Japanese control of Pacific shipping has already very largely increased reshipping in Japanese ports, particularly Kobe.

TARIFFS.

The present Japanese tariffs went into effect July 17, 1911, and are fully set forth in the Bureau of Foreign and Domestic Commerce Tariff Series No. 28, revised in June, 1912. The duties imposed are protective wherever there are Japanese manufacturers to protect, and this no doubt will be the future policy of the Japanese Government.

TRADING CENTERS.

Yokohama and Kobe are large trading centers and are important points for export and import business, but Tokyo is most important from the standpoint of railway markets for the reason that this is the headquarters of the Imperial Government Railways of Japan. Osaka is also an important trading center, being the center of the largest industrial and tramway district in Japan.

INDUSTRIAL CENTERS.

The largest all-round industrial center is the Osaka district, including Kobe, Kyoto, and the districts surrounding Osaka Bay. Next in importance is the Tokyo-Yokohama district, including the districts surrounding Tokyo Bay, but the Moji-Shimonoseki district is also very important and has the distinct advantage of close prox-

imity to the fuel supply on the island of Kyushu. The advantages of fuel supply may also lead to considerable industrial development on the North Island, particularly at Muroran, near which there is now a steel plant (though it can hardly be considered successful thus far).

INDUSTRIAL LABOR.

One of the supposed advantages of Japan is the large supply of cheap and industrious labor, a discussion of which is beyond the scope of this report. The writer, however, is inclined to believe that this asset has been somewhat overrated. In the first place, there is not the great supply of available labor that is supposed to exist. As a matter of fact, there was a shortage of labor in all the heavy industries when the writer was in Japan in 1917; at least, this was the case at the coal mines, at the shipping ports, and on the railways (particularly in the workshops). As long as the present large percentage of people are occupied in agricultural pursuits, the present labor supply is not going to be materially augmented.

In the heavier industries the Japanese labor is not particularly capable nor are the present methods of working efficient; but both of these conditions can and probably will be improved. One feature that impressed the investigator was the number of women employed in the heavy industries, particularly coal mining and construction work. The percentage of women in railway work is not nearly so great as in some other classes of work. In 1917 the percentage of women in railway employ was only 3.35 per cent of the whole, more than one-half of them being employed in flagging grade crossings. Careful observation led to the conclusion that the Japanese are better developed in the line of novelty industries than in heavier manufacture and that this is particularly true of electrical work, in which connection they also show a decided technical adaptability.

In regard to the wages paid in the heavy industries, it was found difficult to obtain data that would enable definite conclusions to be arrived at. However, in such works as the Kisha Seizo Kaisha and the Kawasaki Dock Yards, it was ascertained that, from 1905 to the beginning of the war, such wages as \$0.20 to \$0.30 gold per day were paid for various forms of common labor; more or less skilled labor around these shops was paid from \$0.35 to possibly \$0.45, and good mechanics seldom received more than \$0.50 per day. These figures are only approximate, and the wages seem to vary unaccountably in different situations. Wages since the beginning of the war have been very generally advanced in all classes of heavy industrial work, and now in the above works various forms of common labor vary from \$0.25 to \$0.50 (and probably higher for some of the better grades of labor). Skilled-mechanic labor now varies all the way from \$0.50 to \$2 per day, although it may be considered exceptional for wages to exceed \$1.50 per day. At such points as Nagasaki Harbor, the supply of labor has been entirely inadequate; wages have been generally doubled and in some cases trebled or even more largely increased. Persons who were paid \$0.15 to \$0.20 per day before the war have been earning \$0.35 to \$0.50, and in some instances considerably more, for such work as coaling ships on passage through Nagasaki. Here a large number of women are employed and the labor demand and supply are both variable.

There are no actual labor unions in Japan, and labor organizations as such are in effect prohibited. There is, however, an organization known as "The Friendly Society," which has about 400 branches and 30,000 members and whose purpose is the general betterment of labor conditions. It may be stated definitely that the workmen of Japan, like those in most other parts of the world, are acquiring the general habit of looking after their own interests in a collective way. This fact was illustrated, to a certain extent, by the objection to, and effective stopping of, the bringing of Korean railway laborers to the Moji district in the early summer of 1917. The Japanese manufacturers, in years to come, will no doubt experience labor troubles, but, notwithstanding this, they will be able to take care of many (if not most) of their own railway requirements in the future, particularly if they can secure the requisite raw materials; and, in addition, they will unquestionably be active competitors in the other railway markets of the Far East, especially through their utilization of Chinese labor in Manchuria and possibly Shantung. The Japanese are manifesting administrative and organizing capacity in the utilization of Chinese labor in those regions, although they may not make the occupation particularly attractive or interesting for the Chinese coolie in their employ.

RAILWAY EMPLOYEES AND WAGES.

The number of employees in the Japanese Government Railways, as of March 31, 1916 and 1917, was 19.5 and 19.7 per mile of line for the respective years. The Bureau of Railway Economics Bulletin 103 gives the average number of employees on those American railways that earn more than \$1,000,000 a year, for the year ended June 30, 1915, as 6.3—this indicating that the Japanese Government Railways have, in round numbers, three times as many employees as American trunk-line railways.

The following table of wages for the several classes of employees from 1894-95 to 1915-16 shows, notwithstanding the present low wages, that the compensation for all classes of the Japanese Government Railways employees has practically doubled during this period. The president of the railways received in 1915-16 \$311.55 per month; the vice president and engineer in chief each received \$207.75; the 11 directors in 1915-16 received an average of \$161.65 per month, as compared with \$157.17 per month for the 6 directors in 1914-15; 7 engineers in 1915-16 received an average of \$148.96 per month, as compared with \$165.84 for 12 engineers in 1914-15. The wages of other employees have been as follows:

Class of employees.	1894-95		1899-1900		1904-5	
	Number of employees.	Average amount per month.	Number of employees.	Average amount per month.	Number of employees.	Average amount per month.
Officials and engineers:						
Higher grade.....	2	\$135.10	4	\$145.43	3	\$144.90
Lower grade.....	39	51.65	71	57.16	85	63.53
Clerks.....	717	10.22	1,286	12.51	1,328	16.50
Assistant engineers.....	151	13.19	290	17.93	265	22.79
Employees.....	873	5.01	2,570	6.49	3,114	7.42
Servants.....	8,111	4.34	14,391	5.96	18,666	6.64
Total.....	9,893	5.18	18,612	6.90	23,461	7.71

Class of employees.	1909-10		1914-15		1915-16	
	Number of employees.	Average amount per month.	Number of employees.	Average amount per month.	Number of employees.	Average amount per month.
Officials and engineers:						
Higher grade.....	10	\$134.85	21	\$175.32	20	\$167.00
Lower grade.....	441	55.00	451	75.06	450	76.07
Clerks.....	4,492	17.18	4,569	21.83	4,675	21.92
Assistant engineers.....	1,361	21.67	2,140	26.20	2,190	26.11
Employees.....	22,311	8.94	30,119	9.93	29,985	10.10
Servants.....	60,118	7.24	77,964	7.83	74,782	7.94
Total.....	89,323	8.72	114,964	9.53	112,102	9.75

Preliminary figures give the average wages for 115,282 employees for the year ended March 31, 1917, as \$9.75 gold, which is exactly the same as that for 1916, notwithstanding the large increase in all other classes of wages in Japan. It is stated, however, that considerable advances have been made since that time; the writer has no detailed information as to the amount. Bulletins Nos. 100 and 103 of the Bureau of Railway Economics give the average monthly wages of all employees of the before-mentioned American railways for the years ended June 30, 1913 and 1915, as \$63.70 and \$68.88. This shows that the average wages on the American railways, in round numbers, have been normally seven times as high as those on the Japanese Government Railways.

The performance figures of the Japanese railways for the years ended March 31, 1913, 1916, and 1917 show that 30,425, 33,650, and 40,700 ton-miles (2,000 pounds moved one mile) were handled per employee. The above-mentioned bulletins show that the trunk-line railways of the United States, for the years ended June 30, 1914 and 1915, moved 166,050 and 195,700 ton-miles for each employee, or, in round numbers, five times as many ton-miles per employee as the Japanese Government Railways. The same data show that the Japanese Railways for the years ended March 31, 1914, 1916, and 1917 carried 32,900, 32,300, and 37,800 passengers one mile for each employee, and the American railways for the years ended June 30, 1913 and 1915, carried 19,000 and 23,000 passengers one mile for each employee. More than 85 per cent of all the Japanese passengers are moved third class and less than 1 per cent are moved first class.

With the above data it is a very interesting computation to decide the relative efficiency of the Japanese Government Railways as compared with the American railways. In the writer's opinion the Japanese performances are efficient enough to warrant the statement that in all probability the Japanese will largely take care of their own manufacturing of railway materials in the future and (at least at times) be active competitors in other railway-material business in the Far East.

III. GENERAL TRANSPORTATION CONDITIONS.

COASTAL SHIPPING.

Japanese progress in shipping in recent years, particularly since the beginning of the present war, has attracted much attention. Coastal shipping in one form or another has for hundreds of years been a feature of Japanese domestic trade. At present the coastal shipping is very extensive and consists of a great variety of vessels, from modern steamships to sailing vessels—the latter being similar in many ways to the ordinary type of Chinese junks. All the industrial centers, particularly Osaka, Tokyo, and Moji, are served by this coastal shipping. The Osaka and Tokyo districts are both provided with a system of canals on which is moved a very considerable amount of traffic, practically to the doors of the small factories that abound in both of these districts; this also applies to a number of the large plants. The writer observed the operations on these canals in Osaka and was very much impressed with the immense advantage to the district of this system of transportation, connecting with a protected basin in the Osaka harbor, where materials were received and delivered directly from and to seagoing coastal vessels. This arrangement, with the labor available, unquestionably affords a cheap and effective local handling of freight and greatly relieves the street congestion of these crowded districts.

HIGHWAYS.

There are several historical highways or roads of travel in Japan, of which the most noted is probably the Takaido, the ancient highway from Tokyo to Kyoto and Osaka. There are roads over all parts of Japan largely used for moving agricultural products in mule carts, hand carts, and to a considerable extent by carriers. Few of these roads are macadamized, but since many of them are through the agricultural districts where irrigation is extensive, particularly for the growing of rice, the general practice is to raise the road considerably above the surrounding ground, generally giving good drainage. These roads are usually well maintained, and this method of construction in the course of time has caused the roads to become surprisingly hard, considering the class of material used in their construction, and the result might be called an extreme case of the adaptation or solidification increment as spoken of in the valuation of grading work.

CHARACTER AND DEVELOPMENT OF JAPANESE RAILWAYS.

CLASSIFICATION.

Railways in Japan can be divided into three groups, as follows: (1) Imperial Government Railways of Japan; (2) privately owned and operated steam railways; (3) tramways. The second of these are again divided into what are known as private railways and light railways. The private railways are lines not ordinarily having any guaranty from

the Government, although some of these private railways in recent years have made extensions and additions to the extent of \$1,296,075 gold, which has been so guaranteed. The light railways are lines subsidized under the Light Railway Law, promulgated in 1911 and revised in 1914, whereby private light railways are guaranteed a profit, with the limit of 5 per cent of their construction expenses, for a period of 19 years after the date of opening for business. Most of this light-railway mileage has been built since the Railway Nationalization Law was passed in 1906, although a few of the lines were in existence as early as the nineties, and one in 1888. Tramways, as shown later, can be subdivided into electric, steam, gas-motor, horse, and man-power, and can also be subdivided into those municipally owned and operated and those privately owned and operated. No guaranty is made for any of these tramways, and they are therefore shown under one general group.

The following table shows the classification and general statistics of all classes of railways in Japan as of March 31, 1916. The mileage for the Government railways had increased to 5,857.6 miles by March 31, 1917, but as complete information for that year is not yet available the data for the previous year have been used:

Items.	Kind of railway.				
	Government.	Private.	Light.	Tramway.	Total.
Number of companies.....		8	112	136	256
Miles of line open.....	5,756.8	272.5	1,471.1	1,255.1	8,755.5
Miles of all tracks.....	8,840.1	380.0	1,731.3		
Miles of line under construction.....	759.0	82.0	1,801.0	280.0	2,931.0
Number of locomotives.....	2,661	674	310	226	3,871
Number of passenger cars.....	6,836	354	1,201	4,084	13,075
Average seating capacity—persons.....	555	47	40		
Number of goods wagons.....	42,640	1,226	3,517	1,779	49,162
Average carrying capacity—pounds.....	21,125	16,400	19,650		
Number of service cars.....	942				
Number of directors and general officers.....	(b)	46	883		
Number of other employees.....	(b)	2,639	8,927		
Total number of employees.....	112,102	2,685	9,810	17,053	141,652
Average monthly wages of directors and general officers.....	(b)	\$34.09	\$7.57		
Average monthly wages of other employees.....	(a)	\$5.64	\$6.71		
Average monthly wages of all employees.....	\$9.75	\$7.94	\$7.31		

a Excludes nonpassenger-carrying cars.
b See figures on page 149.

HISTORICAL SURVEY.

Dr. Watarai, in his "Nationalization of Railways in Japan," gives the first proposals for railways as made by the English ambassador in 1869, which, after much opposition, finally resulted in the opening of the 18-mile line from Tokyo to Yokohama in 1872—the first railway in Japan constructed and operated as a Government line. The next was a Government line between Kyoto and Osaka, opened in December, 1873, and extended to Kobe in July, 1874.

Dr. Watarai very properly divides the history of the railway development in Japan between the Government railways and the private

railways; he then divides each of these into three different periods. The three periods for the Government development are as follows: (1) From the beginning to the completion of the Tokaido Railway, covering the interval from 1872 to 1879; (2) from 1890 to the nationalization in 1906; and (3) from that time to the present. The three periods for the development of private railways are: (1) From 1882 to the war with China in 1894; (2) from 1895 to the nationalization in 1906; and (3) from that time to the present.

Until 1882 the actual building of railways was done entirely by the Government, although private interests had considered several projects. The first really private line was the Ueno-Kumagai line, 38 miles in length, opened in July, 1883. This line promptly showed a profit of about 10 per cent, and from this time until the beginning of the Chino-Japanese War private interest was active in building railways, with the result that by the end of 1893 (or practically the beginning of the war with China) there were 1,368 miles of private railways against a total of 557 miles of Government railways. Many of these private railways were given assistance in the way of loans or other help and encouragement from the Government, and from the first their construction was regulated so that there never has been any destructive competition between the various lines.

As a result of the war with China the need of railways was appreciated more than ever, particularly by the military authorities, and until the war with Russia there was a growing sentiment for the nationalization of all the important lines, though there was sufficient opposition to prevent such action. The result was that during this period Government building was accelerated but private building still continued extensively. At the end of 1904 (practically the opening of the Russo-Japanese war) there were 1,470 miles of Government railways and about 40 private companies, with a mileage of about 3,230, of which 2,340 miles were owned and operated by the six largest companies.

Since the nationalization in 1906 the private railways have been gradually disappearing and the so-called light railways, for the development of the immediate country through which they are built, are being encouraged and fostered by the authorities.

NATIONALIZATION OF RAILWAYS.

The nationalization of the Japanese railways is a very interesting incident in the world's railway history, and for a student of this subject Dr. Watarai's book, above mentioned, will be found to give a very good account of how it was consummated and the attendant results up to the end of 1914.

The first move to nationalize the railways was made in 1891 by the Matsukata cabinet. This same cabinet made the second effort in 1892. The third movement was made by the Liberal Party in 1899 as a result of the Chino-Japanese War. The fourth movement was by the Yamagata cabinet in 1900, and the fifth and final effort was made in March, 1906. This law was passed by the Japanese Parliament in considerably less than a month by a large majority, notwithstanding the fact that if extended discussion had been allowed there would probably have been considerable opposition. It was first proposed to nationalize 32 of the largest lines, but the scope of the plan was reduced to include only the 17 most important railways. At

hearings, Mr. Oishi, leader of the Progressive Party and chairman of the special nationalization committee, made formal inquiry on six points. Three of these questions and their answers are very interesting, as is one question that was not answered. Dr. Watarai gives these as follows:

Q. What danger is there in the present system of private railroads, regarded from the point of view of national defense?

A. (By Minister of War TERAUCHI.) National defense is defensive and offensive, and systematically related railroads are necessary not only to passive, but also to active protection. As concerns the first case, we have had a most unfortunate experience with the private roads; and in the other contingency, in which the cooperation of maritime interests is needed, the private roads have again proved themselves insufficient. It was further shown in the war with Russia that the operation of the private railroads, constructed with poor materials, was absolutely deficient.

Q. Does not the new loan of about a half billion yen mean too great a burden upon the State exchequer, which has already been exhausted by the war with Russia? Further: Will the flow of money to other countries be increased and our system of bank notes weakened?

A. (By Minister of Finance SAKAYA.) According to the investigation of the Minister of Communications, the State roads will yield 50 million yen annually to the State exchequer, when, after 40 years, the amortization of the railroad loans has been completed. Although an addition to the State debts is not pleasant to contemplate, one need harbor no doubts, for the loan in question is a productive one; there will, therefore, be no burden upon the whole nation, because the accounting system used for the railroad loans will be separated from the general budget.

Q. After the actual nationalization, will the tariff rates be lowered, and will the present narrow gauge be replaced by the standard gauge?

A. (By Minister of Communications T. YAMAGATA.) The administration is planning a lowering of tariff rates, but it can give no further particulars concerning the exact rates; the question of the gauge is not yet ready for discussion.

Q. Do not the unremunerative lines included in the resolution have a bad effect on State finances?

This question was not answered.

The question of the compensation given to the private owners by the Government is very interesting, but the reading of the law on this point is not quite clear. The writer consulted several authorities but did not obtain a translation that can be quoted. A careful study of the data, however, seems to warrant the statement that the substantial result was the taking over of all the obligations by the Imperial Government of Japan in the form of bonds or similar liabilities bearing a fixed rate of interest. The capitalization of all the properties was then determined on a 5 per cent basis, after deducting what might be called the funded obligations mentioned above, and, as the roads had earned an average of something more than 9 per cent for the three years preceding, this amounted to a very considerable profit to the private owners over the original cost of construction. The nationalization proceeded very promptly after the passing of the law, and in less than one year after the promulgation of the law all of the 17 roads had been taken over. The total construction cost (including amounts that had been expended during the interval while arrangements were being made to take over the roads) totaled \$120,455,650 gold, and the final price paid amounted to \$235,565,300—an advance of \$115,109,650—thus showing an actual profit of about 95 per cent on the original investment, without consideration of return during the interval of private ownership. The above figures are taken from Dr. Watarai's data.

No loans were raised for the taking over of any of these lines, but the owners accepted Government obligations bearing 5 per cent for the entire amount. It was assumed, in the nationalization plan, that the

railways would self-amortize in about 40 years, but this anticipation is far from being realized for the reason that, although the lines have been fairly profitable, the progress of Japan has made it necessary to return to the property much more money than the profits have amounted to. This has been the usual result in all other similar situations. In other words, the railways of a growing country ordinarily require much more money put into them in the way of betterments and additions than it is possible for the most profitable to earn.

WIDENING OF GAUGE.

The gauge on the Government railways, private railways, and light railways is mostly 3 feet 6 inches. Ever since the Chino-Japanese war, and particularly since the Russo-Japanese war, there has been a very decided sentiment in favor of widening the gauge of the Government Railways to 4 feet 8½ inches. Both commercial and military reasons are given in support of this, but the arguments for national defense form, no doubt, the main considerations. A short time before the beginning of the world war an Imperial Commission made a very careful study and recommended that the gauge on all lines be widened. The estimated cost was almost equal to the total capitalization of the railways at that time, or about \$450,000,000 gold, and the program contemplated about 20 years for the making of the change. This length of time was later reduced to about eight or nine years, but this reduction of time involved no reduction in the estimated cost. This scheme, however, was not only for a widening of the gauge to 4 feet 8½ inches, but was a most comprehensive program for actually reconstructing the most important lines by carefully worked-out grade and curve reductions, which would have resulted in high-speed railways through the rough country of Japan where the securing of such lines would be very expensive in any event.

At present there is under consideration a much less ambitious scheme proposed by Dr. Shima, chief of the mechanical department, consisting of an ingeniously worked out arrangement for exchanging axles and wheels of the different gauges under cars in transit (mostly goods wagons), and widening the gauge by successive sections. The motive power and most of the passenger equipment would be changed permanently in progressive steps, but the exchange of axles and wheels under the goods wagons would extend over a very considerable period. This scheme contemplates a very small amount of betterment in the grade and alignment conditions but will mean only a fraction of the expense that would be involved in the more elaborate scheme. While the writer appreciates the rashness of hasty conclusions, still, in view of the recent developments in electrical construction and the dense population of Japan, he feels warranted in stating that a plan for high-speed electric lines along selected routes giving the ultimate result of paralleling the present steam routes has much to commend it, particularly when it is considered that the freight traffic of Japan is largely highly classified business and only a small portion is moved in commodity bulk. Further, allowance is to be made for the fact that the Japanese 3-foot 6-inch equipment is designed on the widest practicable measurements. The present equipment has a height of 12 feet 6 inches, which is equal to that on any British 3-foot 6-inch line, and a width of 8 feet 10 inches, which

exceeds that on most, if not all, British lines of that gauge. Some of the passenger equipment is 36 feet between truck centers and 56 feet between coupler knuckles. All of this indicates that the Japanese have gone to the limit in dimensions, and it is quite apparent that a plan designed to secure any substantial benefit as a whole must involve the grade and alignment improvements already mentioned.

JAPANESE RAILWAY POLICY.

The policy of the Imperial Government of Japan is for the Government to own and operate the trunk lines and all important branch lines. This policy has been consistently followed since the nationalization of the principal railways in 1906, and has involved the taking over of a number of the private railways since that time and the building of additional lines and extensions. The so-called private railways are all being gradually taken over; two of these, totaling 54.9 miles, were taken over during the year ended March 31, 1918, leaving only six private railway companies.

The building of the light railways is strictly regulated under the law referred to on page 152. One very interesting feature in connection with the payment of the guaranteed subsidies is that when paid the funds are taken from the Imperial Government Railway Department's budget, and not from the general treasury funds as would naturally be expected. There is probably good logic to support this procedure, in that these light railways are feeders to the main railways and all the business is a very short haul. The amount actually paid in subsidy for the year ended March 31, 1916, was \$449,876.

GOVERNMENT CONTROL AND REGULATION.

The control of the financing, construction, equipment, operation, and rates of the private railways or light railways and of all the tramways is vested in the "general department" of the Imperial Government Railways. This regulation and control is very complete and painstaking in every particular, especially in what is included as cost of construction and also as to what standards of roadway and equipment shall be used by all these various classes of lines.

CONSTRUCTION PROGRAM.

For the future construction of the Imperial Government Railways and the light railways the Imperial Government has worked out a very carefully considered program and all construction must conform to this scheme. The "general department" of the Imperial Railways directly decides whether or not additional light railways or tramways shall be built. One feature kept constantly in mind is that no duplicating lines are to be built unless there is a local need for them. This is undoubtedly a wise policy, and a similar arrangement should be worked out for every country that has not yet measurably completed its railway development. Such a complete and comprehensive scheme should be worked out in China, where very great benefit would accrue.

IV. IMPERIAL GOVERNMENT RAILWAYS OF JAPAN.

EXTENT.

The preliminary data for the Imperial Government Railways of Japan for the year ended March 31, 1917, show a total of 5,856.6 miles of lines and a total of 9,029.2 miles of all tracks, or 1.54 miles of all tracks to 1 mile of line. As all the data for 1917 are not available, the data referred to hereafter in this report, except where so stated, will be for the year ended March 31, 1916.

The entire system is divided into five grand divisions. The eastern division, with headquarters at Tokyo, is composed of all the lines on the main island east and northeast of Tokyo, amounting to 1,846.0 miles. The central division, with headquarters at Tokyo, includes the lines between Tokyo and Mibara, amounting to 966.7 miles. The western division, with headquarters at Kobe, includes the lines between Mibara and Shimonoseki, as well as all the lines on the island of Shikoku, amounting in all to 1,274.1 miles. The lines on the island of Kyushu, amounting to 725.1 miles, form the Kyushu division, with headquarters at Moji; and the lines on the island of Hokkaido, amounting to 944.4 miles, form the Hokkaido division, with headquarters at Sapparo.

ORGANIZATION AND OPERATING METHODS.

The parliamentary head of the Japanese Government Railways is the Prime Minister. The administrative and operating head is the president, who has under his direction a complete organization, consisting of a general staff and a director with a complete division staff in charge of each of the five divisions above mentioned.

The system of operation is the departmental or branch method already mentioned, but there is superimposed the added feature of what might be termed a semimilitary organization. By this it is meant that each official is given a rank and grade, with the result that in every contingency there is a ranking official who will have authority to take action. The general administration, in charge of the president, has a vice president and a general staff divided into six departments, or bureaus, as follows: Secretariat, general administration, traffic, finance, engineering, and machinery and rolling stock.

The duties of the several bureaus are indicated by the titles, except the general administration bureau, which may be regarded as a commission for the control and regulation of the light railways, private railways, and tramways. This bureau consists of three members, one of whom is the director, one the secretary, and one an engineer. They supervise in every sense the actions and operations of all the above classes of railways, even to the extent of the specifications for materials and equipment to be bought.

The method of train operation is the typical "station-master method" in all details, and, with the conditions present and the help available, this is admittedly the eminently safe and proper arrangement. Outside of the Tokyo electrified district the signaling is all in accordance with British Board of Trade practice, but the lines as a rule are inadequately signaled. In the Tokyo electrified zone some automatic signals are installed, but these are somewhat out of date and include several kinds of signals. With the amount of traffic on the Japanese Government Railways and the small amount of signaling at present, there is every reason why the most modern method of signaling should be adopted for future work. It is important that these lines be adequately signaled as the traffic grows, and they will ultimately require very intensive signaling.

Another feature would be the extensive use of selective telephone apparatus for establishing central control—by this means retaining all the safeguarding features of the station-master method of train operation and still getting the permissible expedition of despatching methods.

TRAFFIC AND RATES.

The following table gives the performance figures of the Imperial Government Railways of Japan for the years ended March 31, 1914, 1916, and 1917:

Items.	1913-14	1915-16	1916-17
Miles of line open.....	5,470.7	5,756.8	5,856.6
Total investment assets.....		\$510,277,620	
Investment assets per mile of line.....		\$88,625	
Total working revenue.....	\$56,568,312	\$59,923,860	\$70,415,784
Total working expenses.....	\$27,193,706	\$27,717,440	\$30,490,027
Operating income.....	\$29,374,616	\$32,206,420	\$39,925,757
Operating ratio..... per cent.	48.1	46.3	43.3
Interest charges.....	\$17,734,558	\$18,335,956	\$19,847,931
Subsidies to private light railways.....	\$373,875	\$623,125	\$623,125
Addition and extension charges.....	\$1,398,617	\$1,174,065	\$2,010,330
Total income deductions.....	\$19,507,050	\$20,133,146	\$22,481,386
Balance to surplus.....	\$9,867,466	\$12,073,274	\$17,444,371
Yearly working revenue per mile of line.....	\$10,578	\$10,459	\$12,120
Yearly working expenses per mile of line.....	\$5,045	\$4,838	\$5,248
Yearly operating income per mile of line.....	\$5,493	\$5,621	\$6,872
Number of passenger train-miles.....	22,364,524	25,100,646	26,050,412
Number of goods train-miles.....	23,809,091	21,940,022	26,571,150
Number of mixed train-miles.....	12,229,188	12,283,814	11,921,812
Total train miles.....	57,402,803	59,330,482	64,543,374
Working revenue per train-mile.....	\$0.987	\$1.012	\$1.091
Working expenses per train-mile.....	\$0.473	\$0.469	\$0.473
Operating income per train-mile.....	\$0.514	\$0.543	\$0.618
Number of passengers carried.....	167,773,143	172,290,045	197,043,320
Number of passengers carried 1 mile.....	3,690,964,619	3,856,536,966	4,255,374,717
Coaching earnings.....	\$27,893,718	\$28,554,246	\$32,290,396
Earnings per passenger carried 1 mile.....	\$0.00693	\$0.00673	\$0.00693
Number of tons (2,000 pounds) of goods carried.....	40,710,165	40,096,744	47,152,822
Number of tons of goods carried 1 mile.....	3,420,304,955	3,706,606,918	4,680,620,819
Goods earnings.....	\$26,604,413	\$28,436,177	\$34,825,782
Earnings per ton of goods carried 1 mile.....	\$0.00718	\$0.00768	\$0.00739

It will be noted that the passenger and freight earnings are very nearly equal. For several years past the freight earnings have been increasing faster than the passenger earnings, and, with the continuation of the industrial development of Japan, this in all probability

will continue until the freight earnings will measurably exceed the passenger earnings. From this same table the earnings per passenger carried 1 mile will be noted as 0.668 cent, and 0.739 cent for a 2,000-pound ton carried 1 mile. These figures are for the year ended March 31, 1917. The corresponding average receipts for the railways of the United States for the year ended June 30, 1915, were 1.985 cents per passenger carried 1 mile and 0.732 cent per 2,000-pound ton carried 1 mile, as shown by the Bureau of Railway Economics, Bulletin No. 103.

For the year ended March 31, 1916, only 0.17 of 1 per cent of all passengers rode first class, 4.05 per cent rode second class, and 95.78 per cent rode third class. The first-class passengers made an average ride of 91.1 miles, the second class 55.8 miles, and the third class 20.8 miles; the average ride for all passengers was 22.4 miles. The average earnings for first-class passengers were 1.40 cents per mile, second class 0.85 cent per mile, and third class 0.63 cent per mile. These figures do not include berth and excess-luggage charges, but do include extra fare charged first and second class passengers on some express trains.

For the year ended March 31, 1916, the coal traffic constituted about 40 per cent of the total tonnage. Lumber was the next largest item, constituting about 7½ per cent, and rice was third, amounting to nearly 5 per cent. All minerals combined made the fourth item, amounting to 2½ per cent. The very large number of commodities that constituted the remainder of the traffic confirms the statement made regarding the class character of the goods business. The average earnings for less than carload shipments for the above year were 1.598 cents per 2,000-pound ton per mile, and for carload shipments the average earnings were 0.659 cent per ton-mile.

OCEAN FERRY SERVICE.

An important feature of the Japanese Government Railway operations is the shipping (or, rather, what might be called the ocean-going ferry) service from Shimonoseki to Fusan—the port at the southern terminus of the Korean Railways—and the car transfers and ferries between Shimonoseki and Moji.

On March 31, 1916, the railway administration owned 40 steamers of all classes and had 4 others under charter, making a gross tonnage of 20,700 (Japanese basis). The length of route worked was 298 nautical miles, and the average number of daily trips was 132.

For the above year the number of passengers carried was 232,318, with earnings of \$609,356. The cargo handled totaled 1,024,390 tons of cargo, and the earnings realized were \$509,811 from cargo, \$43,151 from parcels, and \$43,916 from mail, thus making a total of \$1,205,234 for shipping operations.

There are in all nine routes; eight are under the jurisdiction of the western division and one is under the jurisdiction of the Hokkaido division.

BUDGET AND ACCOUNTS.

As early as 1887 a law required the Government Railways account to be separated from the other treasury accounts. After nationalization this law was modified, but the accounts were still left under

what might be called treasury control. The results were unsatisfactory, particularly as regards failure to provide necessary amounts for taking care of the railway situation, these essential amounts being procured through reductions made in the general Government budget. In March, 1909, a new railway-account law was passed, and Dr. Watarai gives the principal points as follows:

(1) In order that the national railroad enterprises may be successfully carried on, the railroad accounts will be separated from the general State budget. The capital of the railroads will consist of the funds invested, and to be invested, in the railroads and in railroad stocks. The annual expenses shall be defrayed out of the annual revenues.

(2) The necessary funds for additions and improvements will be provided by the operating income. If this does not suffice, a loan or some other form of liability will be contracted, which is to be included in the railroad accounts. The total amount of loans and liabilities may not exceed that allowed in the estimate for additions and improvements.

(3) In order to regulate or to discharge the loans and other liabilities incurred for the purposes of managing the railroads, the Government may issue a new loan, or a call loan, on the State administration, which the railroad administration must enter on its debit account.

(4) The loans that are issued for the State roads—including those contracted for their regulation or amortization, on the grounds mentioned above in 2 and 3, and those loans or other liabilities contracted according to the law of nationalization—are, if not yet paid off, to be charged to the railroad debit account. The sums needed for the payment of interest and sinking fund are to be transferred from the railroad account to the books of the special fund for amortizing State debts.

(5) After subtracting the amount destined by law for the reserve fund, the rest is transferred to the capital account. By "gain" is to be understood that amount by which the annual receipts exceed the annual expenditures.

The results of this law have been beneficial, but it has not entirely prevented political control of the railway account. During the writer's first visit to Japan the budgets for the Imperial Japanese Railways, the South Manchuria Railway, and the Korean Railways were being considered by the Japanese Imperial Diet, with the result that the general railway officers in Tokyo devoted practically all their time to furnishing information in this connection. The situation reminded one very much of the condition in the various departments in Washington when their appropriation allowances are being considered before the Appropriations Committees of Congress.

The "set-up" of the Japanese Railway account is in a way similar to the American methods, as indicated by the performance figures already quoted. The data are quite complete; in fact, in some particulars they are rather elaborate. One interesting point, however, is that the Japanese have not been any more successful than American railways in allocating the expense between passenger and freight traffic.

INVESTMENT ASSETS.

The term "investment assets" is used for the reason that the amount shown as capital is somewhat misleading. The term used represents the fixed property as usually understood. This item is shown in the table on page 158 only for the year ended March 31, 1916, and the investment assets are given as \$88,625 per mile. While this appears like a very high amount, it indicates the difficulty of railroad construction in most of Japan. Deducting \$115,109,650 profit to the private owners, previously mentioned in connection with the nationalization of the first 17 lines, and assuming that the other figures represent construction costs (which is probably a close

approximation, allowing only a small percentage for "cost plus"), the total construction costs would total \$395,167,970, or in round numbers \$68,500 per mile of line. This figure is surprisingly close to what good authorities estimate the cost of the railways in the United States to be as a whole, but the comparison quickly loses its force when one considers the Japanese 3-foot 6-inch lines in comparison with the American 4-foot 8½-inch lines with their very low grades and small amount of curvature.

EARNINGS AND EXPENSES.

The year ended March 31, 1915, was not a representative year on account of the war and some other internal influences in Japan. For that year there was a falling off in the earnings and an undue increase of expense; therefore, that year will not be referred to except in the averages for the last five years. During the five years ended March 31, 1913 to 1917, there has been an increase of 639 miles of line; traffic revenues have increased from \$53,850,781 to \$70,415,784 and operating expenses from \$25,031,818 to \$30,490,027, making an increase of operating income from \$27,818,963 to \$39,925,757. This shows, with an increase of operating revenues of \$16,565,003, that \$11,106,794, or almost exactly two-thirds, was made effective as operating income, and the operating ratio during this interval was reduced from 46.1 to 43.3 per cent. With the increase in wages and cost of materials, this performance during this particular five years certainly warrants attention from the railway managers in other parts of the world, especially when considered in connection with the average rates per passenger mile and per ton mile already given.

NET INCOME AND SURPLUS.

Interest charges for the year ended March 31, 1913, were \$17,732,942, and for 1917 they were \$19,847,931. Deducting all the other income charges, including the subsidies to the guaranteed light railways, there was carried in 1913 a surplus balance of \$9,786,582 and in 1917 of \$17,444,371. Thus it is seen again that two-thirds of the increase in operating income was carried to surplus balance.

In view of what has already been said regarding the amortizing of the nationalization loans, the question arises as to the disposition of this balance to surplus. The Japanese Railway accounts do not make this clear, but the item shown as capitalization March 31, 1913, was \$464,936,633 and the amount shown March 31, 1917, was \$542,368,028, an increase of \$77,431,375. The aggregate amount carried as surplus for this same period was \$55,752,681, leaving a difference of \$21,678,694, which had to be raised from some other source than railway revenues.

ROADWAY AND TRACK.

The roadway construction in Japan is rather difficult. Grades up to 2 per cent occur on many of the lines, and in numerous cases they exceed this. The alignment as a rule has a great amount of curvature; in some cases this is excessive. The amount of tunneling is probably equal to that of any other similar amount of railways in the world. The matter of drainage and roadway protection is one requir-

ing an unusual amount of attention, because of the fact that many of the lines run through rice-growing areas, and on account of the slipping tendency of much of the side-hill ground in Japan when disturbed by cuttings and embankments. All bridges are built with very large openings for the normal water flow. This is on account of the large volume of flood water during storm seasons. There are a good many very long bridges—sometimes 15 or more spans of considerable length. The greater number of these are over dry channels during ordinary weather, but these openings are sometimes inadequate during the typhoon seasons. Conditions in Japan and China in these respects are in many ways similar, the trouble in China being caused by the fact that the heavy rains run off very quickly on account of the lack of forests.

Station buildings are somewhat along the lines of British and American practice and do not follow the general type of Japanese architecture. Figure 1 (the frontispiece of this book) shows the central station at Tokyo, which is modern in every respect. The lower floor is used as a station, including post office, restaurant, check rooms, etc., while the top floors are used, in part, as a very comfortable European-plan hotel.

The track arrangement and construction are very similar to American and Canadian practice, although the details of track material tend toward British designs. The Japanese oaks and hardwoods are used almost exclusively for ties (sleepers), and the track as a rule is liberally ballasted with broken stone or good gravel. As in China, much of the rock ballast is broken by hand.

Because of the exclusively left-hand running, all signaling is left-handed.

LOCOMOTIVES.

The total number of locomotives in service on March 31, 1917, was 2,727, but the details of these are lacking. On March 31, 1916, there was a total of 2,661, of which 77 were of new superheater type furnished by contract that year. During the same year 16 light locomotives were transferred to the light railways.

Of the 2,661 locomotives, 1,197 were of tank type and 1,365 were of ordinary type with tenders; 62 were Mallets, 25 were Abt, and 12 were electric locomotives. The latter were used on a $3\frac{1}{2}$ per cent grade at Kariuzawa, where there are 26 tunnels (all of considerable length) in a distance of 7 miles. Of the above locomotives, 2,272 use saturated steam and 389 are superheaters. For the superheater locomotives the Friedman (Austrian) mechanical lubricator is generally used. Since the war these are being manufactured in Japan. Figure 37, facing page 163, shows one of the passenger locomotives recently built in Japan. The reader will notice that there is no bell and that the engine has the British type of pilot and the traction-engine type of whistle. The working weight of this engine with full tender is approximately 200,000 pounds, and the maximum over-all height is 12 feet 6 inches. The largest Mallet now in use weighs, in working order with full tender, approximately 220,000 pounds, with the same maximum over-all height.

The present locomotive equipment represents a decided assortment of different makes. Many of the ordinary locomotives are of American manufacture, but some purchased just prior to the war were



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FIG. 36.—MULTIPLE UNIT ELECTRIFIED EQUIPMENT USED IN TOKYO SUBURBAN DISTRICT.

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FIG. 36.—MULTIPLE UNIT ELECTRIFIED EQUIPMENT USED IN TOKYO SUBURBAN DISTRICT.



FIG. 37.—JAPANESE-BUILT SUPERHEATER LOCOMOTIVE.



FIG. 38.—SECTION OF GOODS TRAIN ON JAPANESE GOVERNMENT RAILWAYS.

made in Germany, with the result that the present equipment consists of American, British, German, and Japanese locomotives, with a mixture of the corresponding national practices. The Japanese-built engines follow rather closely the general British practice.

PASSENGER CARS.

As already mentioned, passenger-car equipment is built on the widest limits consistent with stability on track of 3-foot 6-inch gauge, even with the moderate speed of the Japanese railways. This equipment includes all the classes of cars needed to handle the three classes of passengers traveling, including sleeping and dining cars. The maximum permissible height is 12 feet 6 inches and the maximum outside width 8 feet 10 inches; and the present maximum length is approximately 56 feet between buffer faces and 36 feet between kingpins of trucks (bogies). Ball screw couplings of the British type are used with side buffers. Figure 36, facing page 269, shows multiple electrical equipment used in the Tokyo suburban service and illustrates the ball couplers and buffers used. The passenger rolling stock except that in this electrical district is equipped with vacuum brakes. The freight equipment, however, is generally only provided with hand brakes operated by side levers as illustrated by figure 38.

GOODS WAGONS.

The term "goods wagons" is used for the reason that a very large portion of the freight equipment consists of four-wheeled open and covered wagons, as illustrated by the assorted outfit of cars shown in figure 38.

Wheels on all equipment, except a small amount of American equipment, represent the typical British practice of tired wheels with wrought iron or steel centers. The wheels under passenger equipment usually follow the British standard of 42 inches, but there is a considerable variety of wheels under the goods wagons, these being in some cases as small as 24 inches in diameter.

SERVICE CARS.

On March 31, 1916, there was a total of 942 service cars of all classes, of which 867 were construction cars—mostly of the grading type to shovel on and plow or shovel off. Twenty-three were snow plows, 8 were accident cars, and all of the others were gas or water tank cars. There is very little equipment in the way of wrecking or special work outfits along the lines of recent American practice, particularly as regards steam wrecking outfits.

WORKSHOPS.

There are 23 workshops, in which, for the year ended March 31, 1916, there were 13,560 workshop employees, comprising 12,352 workmen, 820 laborers, and 338 coolies. The average daily wage for the above year was 35.34 cents.

During the above year, after some two years of centralized control, this was abandoned and the shop control was decentralized by being returned to the jurisdiction of the several divisions. That is the present arrangement.

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FIG. 37.—JAPANESE-BUILT SUPERHEATER LOCOMOTIVE.



FIG. 38.—SECTION OF GOODS TRAIN ON JAPANESE GOVERNMENT RAILWAYS.

JAPAN.

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The most important, or what might be called the main division, workshops in the order of their importance are as follows: Omiya, 16 miles north of Tokyo; Takatori, a short distance west of Kobe; Kokura, a short distance west of Moji; O-i, in one of the districts of Tokyo; and Naebo, near Sapparo on the North Island. The principal function of the railway workshops is to make all classes of repairs to all classes of rolling stock, although, as stated, some manufacturing of goods wagons and passenger cars is done at certain of these shops, particularly the O-i workshop, and there is also a considerable tendency in all of the larger shops toward the manufacturing of track materials.

PERSONNEL.

A directory of the general staff and division staffs is given on page 269. Particular attention is called to the inspection bureau in the Metropolitan Life Building, New York City, which is specially maintained in connection with the purchasing of materials in the United States.

The designations "engineer" and "secretary" are among the distinguishing features of the organization of the Imperial Government Railways of Japan, and the men thus designated are promoted along their particular lines, engineers in general administrative duties and secretaries along secretarial lines of work.

STORES AND PURCHASES.

In 1913 a centralized system of stores, with a controller of general stores, was put into effect, but in 1915, after two years' trial, this was found unsatisfactory, and a decentralized arrangement was adopted by which the business was placed largely under the control of divisions. Requisitions for stores to be bought are prepared by the divisions and submitted to the general office in Tokyo, which handles purchasing as a section of the financial bureau.

Mention has already been made of the proportion of foreign and domestic purchases, but in this connection it seems proper to quote from the 1915 annual report as follows:

In consequence of the policy of encouraging the purchase of articles of home manufacture pursued consistently by the Imperial Government Railways with the idea of supporting domestic industry, the value of orders placed in Japan has steadily risen for these several years, with the corresponding shrinkage of foreign purchase.

The foreign purchase for 1915-16 indicates a setback to the downward tendency of the preceding years, which is accounted for by the falling-off in the amount of domestic purchase on the one hand and on the other the abnormal appreciation of prices of imported articles due to the exigencies of the war.

As referred to under the caption of "The War and Rolling Stock Materials," the war seriously interfered with the supply of raw materials and finished articles from abroad, particularly in regard to steel, iron, and other metals, which, with the outbreak of the war, jumped to practically double the pre-war level. In the 1914-15 year, however, the rise in the quotations of these items did not affect materially the average cost per piece of the supplies, because no inconsiderable amount of stores had been contracted for before the war. In the following year, 1915-16, a gain of more than 50 per cent was shown in the average cost. The difficulty was further aggravated by the increased restriction on the supply, which, as stated above, operated to hamper the execution of the programs. Notwithstanding the heavy rise in the price of iron, steel, and other metals, the market of other supplies remained comparatively dull down to 1915, but the general level of quotations which took place thereafter resulted in the advance of 30 to 100 per cent in the price of coal, oils, cement, brick, timber, and other staple railway materials. The changed conditions might, indeed, have brought about serious derangement in the railway finances, were it not for the fact that before the war

orders had been placed for the whole stock of coal and oils, the bulk of the cement and brick, and a part of the timber.

Sleepers, too, rose in price as they were restricted in supply, but the railways managed to obtain them at the pre-war price under the convenient arrangements for securing them from the producers direct according to the practice in operation for several years.

Dr. Y. Shima, chief of the machinery and rolling-stock bureau, made a trip to America the latter part of 1917 and the early part of 1918 in connection with the purchasing of railway materials. One subject to which Dr. Shima gave special attention was the matter of axles and wheels and other parts required for the proposed widening of the gauge.

V. PRIVATE RAILWAYS AND LIGHT RAILWAYS.

INTRODUCTION.

It is not easy to decide how much space should be devoted to a consideration of private railways and light railways. While a study of these feeder railways, which have been built for the development of the various districts that they serve, would doubtless be interesting, it is not felt that any extensive reference would be justified on account of the small amount of business that they may be expected to supply (at least directly) to American manufacturers. At times, however, considerable business might come through the class of Japanese concerns already mentioned (see p. 141). The lines are all short. In no case is there as much as 100 miles of all tracks for any group of these roads, and they are generally under the control of local Japanese interests and management. A considerable part of the requirements in the past has been supplied by the Japanese Government Railways in the shape of light, second-hand materials or equipment. All purchases of new articles must conform to the specifications of the general administration bureau of the Imperial Government Railways. Many of the lines are built through very rough country, with heavy grades and sharp curves, generally using light rail, some of which is second hand from the Government Railways. The gauge of a great part of these lines is 3 feet 6 inches, although there is a very considerable amount of 2-foot 6-inch line, as well as some other widths, including a very small amount of 4-foot 8½-inch.

CONSTRUCTION COST AND CAPITALIZATION

The private railways, which are all of 3-foot 6-inch gauge, had cost on March 31, 1916, an average of approximately \$55,500 gold per mile of line. The 3-foot 6-inch light railways cost approximately \$31,500, the 2-foot 6-inch railways \$17,700, and the average cost of all lines was \$30,530. The aggregate construction cost of all these lines is shown as approximately \$53,231,440, against which there is outstanding share capital, bonds, and floating debts of \$74,739,555, or an average of \$42,866 per mile of line.

OPERATING RESULTS AND PROFITS.

The following table shows the performance statistics of all the private railways and light railways in Japan, treated as one system, for the years ended March 31, 1912, 1914, and 1916:

Items.	1911-12	1913-14	1915-16
Miles of line open.....	694.6	1,120.8	1,743.67
Miles of all tracks.....	744.5	1,365.2	2,111.37
Average mileage worked for year.....	522.0	845.0	1,522.00
Total cost of construction of open lines.....	\$20,626,611	\$32,695,255	\$53,231,440
Construction cost per mile of open lines.....	\$34,114	\$29,172	\$30,530

Items.	1911-12	1913-14	1915-16
Total outstanding capital obligations.....			\$74,739,555
Outstanding capital obligations per mile of open lines.....			\$42,866
Total working revenue.....	\$2,453,604	\$3,557,055	\$4,903,294
Total working expenses and taxes.....	\$1,197,389	\$1,898,504	\$2,696,065
Net income (not including subsidies received and with no dividends deducted).....	\$1,256,215	\$1,658,551	\$2,207,229
Percentage of expenses and taxes to working revenues.....	51.2	53.4	55.0
Daily working revenue per mile of line.....			\$8,939
Daily working expenses per mile of line.....			\$4,844
Operating income per mile of line.....			\$3,966
Operating ratio (per cent).....			53.9
Number of passenger train-miles.....	657,845	575,794	743,111
Number of goods train-miles.....	332,052	387,223	563,393
Number of mixed train-miles.....	2,342,832	3,497,893	6,518,231
Total train-miles.....	3,332,729	4,460,910	7,824,735
Number of passengers carried.....	28,827,996	39,267,106	51,390,295
Number of passengers carried 1 mile.....	209,422,229	280,838,412	361,913,312
Couching earnings.....	\$1,625,600	\$2,322,469	\$3,123,712
Earnings per passenger carried 1 mile.....	\$0.0078	\$0.0083	\$0.0086
Number of tons (2,000 pounds) of goods hauled.....	2,983,664	4,237,637	5,790,470
Number of tons of goods hauled 1 mile.....	40,494,024	56,366,894	76,263,090
Goods earnings.....	\$498,888	\$892,973	\$1,340,816
Earnings per ton carried 1 mile.....	\$0.0123	\$0.0158	\$0.0176

About two-thirds of the earnings are from passenger business and one-third from freight and sundry receipts. The average ride per passenger for 1915 was 9.6 miles on the private railways and 5.9 miles on the light railways, the average for the two being 7 miles. The average earnings per passenger mile for the private railways and the light railways were 0.86 cent. The average haul of freight was 18 miles for the private railways and 11 miles for the light railways, averaging 13.2 miles for both. The average earnings per ton-mile for the private railways were 1.49 cents and for the light railways 1.93 cents, the average for both being 1.76 cents.

The earnings of the private railways for the year ended March 31, 1916, aggregated \$1,654,487 and of the light railways \$3,248,807, or a total of \$4,903,294. The working expenses and taxes of the private railways aggregated \$710,396, leaving a profit of \$944,090, equal to about 6.3 per cent on the cost of construction. The working expenses and taxes of the light railways totaled \$1,985,669, leaving a profit of \$1,263,139, which amounted to about 3.4 per cent on the cost of construction. The profit on the cost of construction for both the private railways and the light railways was about 4.2 per cent, which was an increase of about 1 per cent over that for the previous year.

Under the provisions of the Light Railway Law promulgated in 1911 and revised in 1914, the privately-owned light railways are guaranteed a profit of 5 per cent on the cost of construction for a period of 19 years after the date of opening of business. Under this provision 53 of these lines, whose construction cost aggregated \$15,133,270, did not earn the necessary amount to pay this 5 per cent guaranty, and the sum of \$499,876 was paid these 53 companies, the funds being supplied from the budget of the Imperial Government Railways.

The private railways, after payment of all interest and other income charges, showed a net profit of \$984,469, of which \$866,183

was paid in dividends and the remainder carried to surplus balance. The light railways, including the \$449,876 paid them in subsidies, showed a net profit, after payment of interest and other income charges, of \$1,191,450, of which \$1,033,942 was paid in dividends and the remainder carried to surplus balance.

EMPLOYEES AND WAGES.

As shown by the table on page 152, the private railways had 2,685 employees for the year ended March 31, 1916, of whom 46 were directors or officials and 2,639 were wage employees. The light railways had 9,810, of whom 883 were directors or officials and 8,927 wage employees. The average monthly wage of the officials of the private railways was \$34.09 and that of the wage employees \$5.64, making the average monthly wage of all employees \$7.94. There were seven of the directors of private railways who received no compensation in the way of salary; the remaining directors and officials of the light railways received an average monthly salary of \$7.57 and the wage employees received \$6.74, making the average monthly wage of all employees of light railways \$7.30.

OFFICIALS—PURCHASES.

The writer went over the situation to determine whether it was practicable to locate these lines and prepare a directory of officials, but decided that it would be very difficult and take a great deal of time, and that the lists when finished would probably be of small value, so no attempt has been made to show the location of these various lines or to give lists of their officials.

Purchases of most of these lines are handled in a very scattered way and almost entirely through Japanese concerns, although some of the equipment has come from abroad, particularly the small locomotives, quite a number of which are of German manufacture.

VI. TRAMWAYS.

INTRODUCTION.

With 136 concerns, 1,255 miles of line in operation, and 289 miles under construction on March 31, 1916, it will be seen that there is at present an average of less than 11.4 miles of line for each tramway. This is sufficient to indicate that a great deal could be said about the tramway situation in Japan. However, the remarks regarding the private railways and light railways apply to a considerable extent to the tramways, except that special lines of American products are employed—principally electrical equipment, which has been extensively used in the past and probably will be in the future. The financial results of these lines are also interesting, as an indication of what might be expected from tramways in certain parts of China.

EXTENT OF LINES.

The following table shows the performance statistics of all classes of Japanese tramways for the year ended March 31, 1916:

Items.	Kind of tramway.				
	Electric.	Steam.	Gas motor.	Horse.	Man power.
Number of companies	64	22	4	34	14
Miles of line open	667.66	211.65	60.56	244.18	70.40
Miles of line under construction ..	232.62	38.34	2.07	12.36	3.23
Construction cost per mile of line of transportation property	\$163,060	\$11,793	\$15,680	\$4,328	\$6,007
Total construction cost of transportation property	\$108,868,838	\$2,405,937	\$949,538	\$1,056,749	\$317,158
Total construction cost of property of outside undertakings ..	\$29,224,195	\$163,891	\$58,610	\$31,515	\$105,719
Total construction cost of all property	\$138,093,033	\$2,659,828	\$1,008,148	\$1,088,264	\$422,877
Total outstanding capital liabilities	\$155,305,675	\$3,553,200	.....	\$1,404,733	\$576,880
Total outstanding capital liabilities per mile of line	\$232,612	\$12,650	.....	\$5,785	\$8,197
Total working revenue	\$19,275,165	\$382,793	\$148,507	\$290,074	\$171,623
Total working expenses and interest charges	\$12,650,832	\$249,406	\$104,812	\$254,405	\$149,028
Net income (no dividends deducted)	\$6,624,333	\$133,387	\$43,695	\$35,669	\$22,595
Daily working revenue per mile of open line	\$56.23	\$5.29	\$6.40	\$3.08	\$3.69
Daily working expenses per mile of open line	\$26.30	\$3.30	\$3.98	\$2.55	\$2.86
Daily operating income per mile of open line	\$29.93	\$1.99	\$2.42	\$0.53	\$0.83
Operating ratio	46.8	62.4	62.1	83.0	77.4
Working revenue per vehicle-mile	\$0.116	\$0.114	\$0.082	.....	.....
Working expenses per vehicle-mile	\$0.054	\$0.071	\$0.051	.....	.....
Operating income per vehicle-mile	\$0.062	\$0.043	\$0.031	.....	.....

Items.	Kind of tramway.				
	Electric.	Steam.	Gas motor.	Horse.	Man power.
Number of passengers carried....	624,800,286	6,428,420	2,822,032	4,064,980	277,149
Passenger earnings.....	\$12,404,157	\$302,015	\$112,298	\$189,017	\$12,991
Earnings per passenger carried....	\$0.0198	\$0.0470	\$0.0398	\$0.0465	\$0.0475
Number of tons (2,000 pounds) of goods hauled.....	524,337	303,577	89,124	149,283	401,597
Goods earnings.....	\$166,961	\$68,327	\$26,502	\$63,788	\$74,115
Earnings per ton of goods hauled....	\$0.318	\$0.223	\$0.294	\$0.393	\$0.183
Number of locomotives.....	5	147	79	.....	.....
Number of carriages.....	3,849	182	88	437	124
Number of goods wagons.....	251	301	132	577	513

The 668 miles of electric tramways are the most important and will be principally referred to in this text. The largest tramway center at present is the Osaka district, where there are now more than 250 miles of line connecting Osaka with Kyoto, Kobe, Nara, and other parts of this the most important industrial district of Japan. Next in importance is the Tokyo district, with 81 miles of line and 46.5 miles under construction in the city of Tokyo, all under municipal management—in addition to a number of other private tramways, including one to Yokohama. Considering the importance of the Moji industrial district, it has at present a very limited tramway service, there being only one line of about 20 miles, from Moji to Orio. The entire length of this line parallels the water front, which is a continuous line of industrial plants, one of them being the Japanese Imperial Steel Works. In addition to the Tokyo system, the Osaka city system of 35 miles, the Kyoto city lines of 15 miles, and the Kobe city lines of 15 miles are all now municipally owned and operated. All the other lines are privately owned and operated. The Keihan Co., with 33.7 miles in the Osaka district, has the greatest mileage of any of the private companies.

The longest steam tramway line is 29.7 miles, the longest gas-motor line is 32.2 miles, the longest horse line is 15.8 miles, and the longest man-power line is 18.25 miles.

On March 31, 1916, there was under construction 232.62 miles of line of all classes, but there was projected at that time a very considerable additional mileage, much of which will probably be built in the next few years. It seems entirely safe to predict that the present mileage of electric lines will be very considerably increased in the near future.

HISTORICAL SURVEY.

The following from the annual report of the Imperial Government Railways of Japan for the year ended March 31, 1916, is a brief statement of the history of the tramway development:

The Japanese tramways date from 1880, when in February an application was tendered for the construction of the Tokyo Horse Tram Co.'s line. The application was sanctioned and the line was completed and opened for traffic in June, 1883. This was soon followed by others in rapid succession, and, especially since 1888, every year witnessed applications for four or five horse tramway undertakings. The result was the promulgation of the Tramway Regulations by law No. 71, on August 23, 1891, by virtue of which horse tramways and similar means of transportation to be laid on public roads for general traffic came to be authorized subject to the special sanction of the Minister of Home Affairs. On October 22, 1908, it was provided by Imperial

Ordinance No. 266 that application for the construction of tramways under the Tramways Orders should also obtain the sanction of the Minister of Communications; this was subsequently revised by Imperial Ordinance No. 307, whereupon the control of the tramways, as to construction and working, came under the charge of the Imperial Government Railways.

As already mentioned, the control and regulation is handled by the general administration bureau of the Government Railways. It is a matter of interest that the first cars used on this horse tramway in Tokyo in 1883 were secondhand cars purchased from one of the New York City street railways. These were used in Tokyo until the lines were electrified, after which these cars and a quantity of light rail were sent to Mukden, in Manchuria, where they are still in service on the 4 miles of horse tramways running from the railway station to the west gate of the inner walled city.

CONSTRUCTION COST AND CAPITALIZATION.

The total construction cost of the 667.66 miles of electric tramways was \$138,093,033 up to March 31, 1916, but of this amount \$29,223,195 was the cost of outside undertakings, leaving the construction cost of transportation property as \$108,869,838, or about \$163,060 per mile of line. Of this amount, \$88,575 represents expenditures for permanent way and \$46,965 expenditures for rolling stock, power equipment, and buildings, leaving \$27,520 for general expenditures, which is the account carrying promotion expenditures and other similar expenses.

On the above date there was outstanding \$131,656,901 in capital shares and \$23,648,774 in bonds and floating indebtedness, making the total outstanding capital obligations \$155,305,675, or about \$212,700 per mile of line. The capital item, however, as shown in the 1916 annual report, is only \$131,656,901, but this does not include the outstanding bonds, loans, and floating indebtedness.

Separating the capital allowed by prorating the construction costs makes the amount to the transportation properties approximate \$183,500 per mile of line, on which amount the Japanese electric tramways are paying returns in the form of interest or dividends amounting to about 5 per cent. These figures strongly support the statement that electrified lines of light railways should be successful in the densely populated parts of China, particularly when it is considered that the average fare per passenger in Japan is slightly less than 2 cents gold per ride.

TRAFFIC AND RATES.

On the electric lines the traffic is about 97 per cent passenger travel and 3 per cent goods business. This division of traffic varies greatly between the different lines. About 50 per cent of the lines do no goods business, among them being most of the city systems such as those in Tokyo and Osaka. On some of the small (but in some cases important) lines the goods business constitutes about 50 per cent of the traffic, varying from this figure down to a small percentage of the total.

For the year ended March 31, 1916, the average earnings per passenger on all the electric lines was 1.98 cents, and the average earnings per ton (2,000 pounds) of freight was 31.8 cents. The average earn-

ings per passenger and per ton of freight are shown by the table on page 170, and it is interesting to note that a ton of freight is moved with the lowest earnings on the man-power or "ricksha" lines.

As regards the fares on the electric lines, there is a variety of arrangements. Zone fares are used only to a limited extent in Japan, and first and second class fares also prevail only in a few instances. The Tokyo municipal system has a 6-sen (3-cent) fare for a one-way ride with transfer and a 10-sen (5-cent) fare for a round-trip ride, also including transfer. In practice this arrangement seems to work very satisfactorily. Jinrikishas are used generally in all the cities and very few well-to-do Japanese or foreigners ride on the tramways, but the latter are used very extensively by the working people in the industrial districts. Most of the interurban lines have terminal stations and fares are covered by regular tariffs; tickets are sold at the terminals and at most of the important stations, but at other points collections are made on cars. On some of the lines on which the writer rode he was unable to determine how an accurate check-up of fares could be accomplished.

EARNINGS AND EXPENSES.

For the year ended March 31, 1916, the total traffic revenues, including miscellaneous items, of the electric lines were \$13,001,188 and earnings from outside undertakings and investments were \$6,273,977, making the total gross income \$19,275,165. Working expenses amounted to \$6,076,105, expenses of outside undertakings totaled \$2,865,443, and interest charges amounted to \$3,709,284—representing a total deduction from gross earnings of \$12,650,832 and leaving a profit of \$6,624,333, or 6.4 per cent on the cost of construction after the payment of all fixed charges. The above results give an operating ratio of 46.8 per cent for the electric tramways. The operating ratios of the other classes of tramways are shown by the table on page 169.

EMPLOYEES AND WAGES.

Of the 14,538 electric-line employees on March 31, 1916, 5,963 were conductors and 5,003 were motormen or, as they are called in Japan, "drivers." The writer was unable to obtain what he considered reliable data regarding wages. No data on the details of this subject are given in the annual report of the Imperial Government Railways.

ROADWAY AND TRACK.

Tramway location is usually rather difficult in Japan, as applying to both city and interurban lines, on account of the limitations in securing adequate right of way or sufficient room on streets and roads, many of which are crooked and narrow. Most of the older interurban lines were indifferently located and constructed, but some of the more recent ones have been well located and substantially constructed, as illustrated by the line between Osaka and Nara, which is a high-speed line with first-class construction in every respect. On this line there are three well-built double-track tunnels, one of which is about 2.1 miles in length.

The track work on all the lines is very similar to the ordinary American practice, and a considerable amount of the special work is of American manufacture. A great variety of gauge has been used, but a majority of the lines are 4 feet 8½ inches. The rail, as one might expect, is of very great variety of weight and section. The overhead construction is mostly along American lines, with the ordinary single trolley. In a few instances pantagraph contacts are used.

ROLLING STOCK.

As would naturally be expected, there is a great variety of rolling stock on the different lines, but many of the trucks and car frames, as well as a considerable number of the car bodies, have been furnished in the past by American manufacturers. There are several concerns in Japan that have been paying close attention to the furnishing of tramway rolling stock in recent years, one of the most important being the Tokyo Works of the Kisha Seizo Kaisha.

There is a very great variety of electrical equipment, but a majority of the motors and control are of American manufacture, furnished mostly by the companies that have connections with Japanese commercial and engineering contracting concerns. A very noticeable amount, however, of other electrical equipment has been used, particularly German, English, and Swedish, in the order named.

POWER PLANTS AND SUBSTATIONS.

Practically the same remarks can be made about the power-house and converter equipment as about the electric car equipment. At present most of the power is furnished by steam plants, but there appears to be a decided tendency in such situations as the Osaka district to connect up to central power plants, and there is also a strong tendency to utilize hydroelectric sources where such are available.

OFFICIALS—PURCHASES.

The writer spent considerable time in determining what could be done in the way of the preparation of a directory, and although this was found to be practicable for some of the more important lines, the results as a whole were such that it was decided not to attempt to include the usual directory for any of the tramways. The municipal tramways in each case are under the general direction of the mayor.

The large systems, particularly at Tokyo, Osaka, Kyoto, and Kobe (all municipally operated), and the Keihan, Nagoya, and other similar privately owned lines, have organized purchasing branches, and while many of the requirements have been and will continue to be supplied from American sources, this business is closely controlled by the concerns now handling it. Large electrical companies are not only represented in all cases by strong Japanese commercial companies, but as a rule they have their own representative in Japan cooperating with these Japanese concerns. Further, some of the most prominent American electrical companies have established well-equipped factories in Japan, which are not only handling the Japanese business but in some instances are sending their products to China, Manchuria, and Korea.

Part 3.—CHOSEN (KOREA).

I. GENERAL INFORMATION.

INTRODUCTION.

Chosen (Korea) is an elongated peninsula between 33° and 43° north latitude and 124° and 131° east longitude. Its length from northwest to southeast is about 900 miles, and its width from northeast to southwest is something less than 250 miles. Its area is approximately 84,100 square miles, or about the same as that of the State of Minnesota.

The estimates of the population, as in the case of most oriental countries, vary considerably, but roughly it may be said to comprise about 16,000,000 Koreans, 15,000 or 20,000 Chinese, 1,100 to 1,200 Europeans and Americans, and something less than 500,000 Japanese.

The climate for the greater part of the year is mild and dry. The northern and central parts of the country have cold, dry winters. There is a rainy season of something over a month beginning with great regularity before the middle of July and lasting until after the middle of August. During this period the weather is hot and considerable humidity prevails.

The fauna of Chosen includes several species of deer, the tiger, leopard, wild boar, bear, wolf, fox, and numerous fur-bearing animals, among which the sable and sea otter are the most valuable. Game birds of considerable variety and all kinds of domestic fowls abound. The entire peninsula is well stocked with cattle, horses, and pigs.

The history of Chosen goes back many centuries, like that of China. One of the results of the Russo-Japanese war was the establishment of a protectorate over Korea by Japan, this being followed by annexation August 1, 1910. Chosen is now administered by a resident Japanese Governor General, the administration being under the Colonial Department of the Imperial Government of Japan.

PRODUCTS OF THE COUNTRY.

In the past Chosen has been largely an agricultural country, with rice the leading product and beans, oats, and wheat raised in considerable quantities. Lumber from northern Chosen is also an important product, but the central and southern sections have been largely denuded of timber and extensive afforestation by the Japanese authorities is now under way.

Coal is now the principal mineral product, and for the year ended March 31, 1916, it constituted the largest item of traffic over Korean railways. The largest deposits at present developed are those near Pingyang (Heijyo), about half way from Seoul to Antung, near the main line of the Korean railways. Considerable quantities of copper, gold, and graphite are produced—the copper in increasing quantities.

The development of iron mining is being energetically pursued near Pingyang, where a Japanese company is erecting blast furnaces, which will depend entirely upon Korean and Manchurian ores and fuel.

EXPORTS AND IMPORTS.

The principal Korean exports are beans, ores, and rice; the principal imports are coal, sugar, tobacco, and manufactured articles. The exports for the five years from 1911 to 1916 were practically the same from year to year, but the imports increased about fourfold. Many of the goods represented by this increase, particularly the railway equipment, came from American sources, being handled largely by Japanese concerns or American concerns with branches in Japan.

MANUFACTURING.

Little modern manufacturing is done in Chosen. Korean railways have complete workshops at Ryusan near Seoul, and there is a tendency to do a very considerable amount of their own manufacturing in these shops. The tramways in Seoul are also doing most of their own car building at present, buying the necessary parts where they can be obtained to best advantage.

TRADE CENTERS.

Seoul (Keijyo) is the capital and principal business center of Korea; Chemulpo (Jinsen), 25 miles by rail from Seoul, is the principal port, but Fusan is the southern terminus of the Korean railway, and for this reason is of growing importance, particularly as it is only about 10 hours' run for vessels from Shimonoseki. Shingishu (across the Yalu River from Antung), the northern terminus of the Korean railway, is also of growing commercial importance, particularly on account of its harbor at the mouth of the Yalu River and the lumber coming down this river from the northern parts of Korea. Pingyang (Heijyo), on account of its fuel and mineral resources, will probably become one of the important industrial centers of Chosen, and this will cause additional development of the already important port of Chinnampo, connected by a 35-mile branch railway with Pingyang.

LABOR CONDITIONS.

Physically the native Koreans resemble in general the northern Chinese, and when properly handled make fairly good workmen for many lines of heavy industrial work.

Of the 531 officials of various grades in the employ of Korean railways March 31, 1916, all were Japanese; of the 8,699 wage employees 5,359 were Japanese, 3,328 were Koreans, and 12 were Chinese. It is usual, however, for the Japanese to fill the more or less skilled occupations and to depend on the Koreans to do the labor. As illustrating this, it may be stated that all of the administrative, technical, and engineering employees of the Ryuzan workshops are Japanese, but about 70 per cent of the artisans and laborers are Koreans. In the railway shops the Koreans make very good workers, especially in foundry moulding, brass work, and wood work; they do very well, also, on machine tools and erecting work. The writer was told by

experienced mining engineers that the Koreans make excellent rock workers, and they appear to make good grade and track workers. No attempt was made to gather wage data, except as affecting the railway situation.

RAILWAY SITUATION.

With the exception that the gauge of the trunk line and principal branch railways is all 4 feet 8½ inches instead of 3 feet 6 inches, the railway situation in Korea is similar to that in Japan. The railways can be classified as Government railways, including all the trunk lines and important branches, and the privately owned light railways and tramways. These latter might be subdivided into (1) commercial and (2) industrial light railways and tramways, there being a considerable and growing mileage of the industrial class.

On March 31, 1916, there were 1,006.5 miles of Korean Government railways in service and 81.1 miles under actual construction, with a very considerable mileage projected. There were 111.8 miles of light railways and tramways in service and 165.4 miles under construction, and in this case also a good deal of additional mileage was projected. In addition, there are two short-line railways in north-eastern Chosen under the supervision of the Japanese military authorities. One of these runs from the port of Seikoshin to Kanko, where it will connect with the Kankyo line when the latter is completed. The other line is from the port of Seishin, the northern terminus of the proposed Kankyo line, to Kwainai on the Tumen River; this line will become part of the Seishin-Kirin line when that is completed (see p. 179).

II. KOREAN GOVERNMENT RAILWAYS.

INTRODUCTION.

On July 31, 1917, the administration of the Korean Government Railways was consolidated with that of the South Manchuria Railway Co., and this point will be referred to later in connection with the latter company. One of the reasons for this consolidation undoubtedly was to give the Korean railways the benefit of operation with the South Manchuria Railway under a company organization and to obtain the advantages of a company profit-and-loss account, in addition to the general benefits to be derived from consolidating the railways under one centralized efficient management.

As the available data are entirely for the periods previous to this consolidation, the following discussion will refer only to the Korean Government Railways.

EXTENT OF LINES.

The main line runs from Fusan to Seoul (Keijyo) to Antung, a total of 585.6 miles, forming what might be called the Korean part of the Trans-Siberian route to Japan. In addition, there are the following important branches: The Konan line running in a south-westerly direction from Taiden to Moppo, 161.3 miles; the Kei-Gen line running northeast from Seoul to Gensan and Bunsen, 138.4 miles; the Hei-Nan branch from Pingyang (Heijyo) to the port of Chinampo, 34.3 miles; the Masan branch from Sanroshin to the important naval base of Masan, 24.8 miles; and the Kei-Jin branch from Seoul to the important commercial port of Chemulpo (Jinsen), where, because of the fact that the tides rise about 32 feet, there is now being constructed a locked basin for the handling of vessels taken into the basin near high tide. There are a number of other unimportant short branches.

HISTORICAL SURVEY.

Following is a brief history, largely taken from the historical sketches given in the annual report for the year ended March 31, 1916, by the railway bureau of the Governor General of Chosen. The railway lines had their origin in a concession to build and maintain a railway between Seoul and Chemulpo granted to James R. Morse, an American citizen, by the Korean Government in 1896. While the construction was still in progress a syndicate headed by Baron Y. Shibusawa bought the concession and the rights connected with it in May, 1897, and continued the work. In May, 1899, the syndicate was transformed into the Seoul-Chemulpo Railway Co. and the line between Chemulpo (Jinsen) and Roryoshin, 20 miles in length, was opened for traffic in September of that year. The remaining part, about 5 miles, was completed and opened in July, 1900; this is now known as the Kei-Jin branch.

The construction of the line between Seoul and Fusan was taken up in August, 1901, by the Seoul-Fusan Railway Co. under the

terms of a treaty signed between Japan and Korea in August, 1894, as well as a contract entered into between the Korean Government and the above-named company in September, 1898. This line of about 267 miles was finished and opened for traffic in January, 1905, and the same company purchased the Kei-Jin line in October, 1903.

The construction of the line from Seoul to Shingishu, known as the Kei-Gi section, was taken up by the temporary railway department of the Japanese Army in February, 1904, but commercial traffic was not handled until April, 1908.

When the nationalization of the railways in Japan was decided upon in 1906, the Imperial Government of Japan first purchased all of the Kei-Fu and Kei-Jin lines, totaling 296.6 miles; the railway bureau of the Residency General of Chosen was established at the same time. In September of the same year the Kei-Gi line of 332.9 miles and the Masan branch of 25 miles were transferred to the railway bureau. In December, 1909, the jurisdiction of the Korean railways was taken over by the Imperial Government Railways of Japan, but in October, 1910, they were transferred back to the railway bureau of the Government General of Korea, this arrangement being continued until July 31, 1917, when they were consolidated with the South Manchuria Railway.

The construction of the railways in Chosen, particularly the section between Seoul and Shingishu, was carried out very hurriedly, the object at the time being to connect the extreme south of the country and the extreme north as quickly as possible, and to connect a few of the important seaports with the trunk lines by means of branches. Within a few years of completion, however, the reconstruction of the line was taken up and finished in due course of time. With the completion of the railway bridge over the Yalu River and the reconstruction of the Antung-Mukden branch of the South Manchuria Railway, the Korean railways became a link in the line of communication between Europe and Japan by way of the South Manchuria and Trans-Siberian lines.

The Masan branch was built by the military authorities in 1904 and 1905. Since 1906 the Kei-Gen branch, from Seoul to Gensan and Bunsen, and the Konan and Hei-Nan branches, totaling about 350 miles, have been completed and opened for traffic for the development of the country.

There is one very pertinent fact to be borne in mind, namely, that in the building of railways in Siberia, Manchuria, and Chosen by the Japanese and Russians strategic and political factors were given first consideration and commercial utility was considered later. In most cases, in this territory, strategic and commercial utility seem almost to coincide.

In addition to their strategic purpose, the investigator perceives that the Korean Railway and the Antung branch of the South Manchuria Railway possess a function of equal or possibly greater importance in tapping a granary for Japan, to which country these lines provide a direct route through Chosen and across the Fusan Straits to Shimonoseki.

EXTENSION UNDER WAY.

The principal extension contemplated (work on some part of which is now actually under way) is the completion of the Kankyo line from Gensan to the port of Seishin, a distance of about 360 miles,

of which 12½ miles were completed in 1915 and something over 20 miles in 1916. This line will connect near Seishin with the Seishin-Kwainei line, which it is planned to link up with a line to Kirin, Manchuria (see p. 208), where connections in turn will be made with the Kirin-Changchun line; at Changchun connections will be made with the present northern terminus of the South Manchuria Railway and the southern end of the Harbin-Changchun branch of the Chinese Eastern Railway.

CONSTRUCTION COST—CAPITALIZATION—PERFORMANCE STATISTICS.

The table below shows the performance statistics of the Korean Government Railways for the years ended March 31, 1907, 1914, and 1916. The statistics obtainable do not afford sufficient data to determine the construction costs, but the annual report for 1915^a shows the valuation of the Kei-Fu Railway Co., amount defrayed from military funds, and cost of construction and improvements as totaling \$66,264,368, equaling \$65,835 per mile of line, which is probably a rather close approximation of the actual cost of construction.

The total capital invested is shown as \$69,301,761, bringing the item up to \$68,854 per mile of line. This total includes \$349,950 stores fund.

The performance statistics follow:

Items.	1906-7	1913-14	1915-16
Miles of line open.....	641.5	970.2	1,000.5
Miles of all tracks.....	—	—	1,255.5
Average traffic mileage for year.....	639.4	911.1	1,002.3
Capital invested.....	\$39,307,377	\$62,504,944	\$69,301,761
Capital invested per mile of line.....	\$61,274	\$62,258	\$68,854
Total working revenues.....	\$1,756,375	\$3,914,315	\$4,453,813
Total working expenses.....	\$1,794,455	\$3,132,554	\$3,567,199
Profit.....	\$38,080	\$781,761	\$886,614
Operating ratio..... per cent..	102.2	80.0	80.1
Percentage of profit on capital invested.....	-0.009	1.25	1.28
Yearly working revenue per mile of line.....	\$2,747	\$4,285	\$4,453
Yearly working expenses per mile of line.....	\$2,806	\$3,439	\$3,539
Operating income per mile of line.....	-\$59	\$840	\$894
Passenger train mileage run.....	879,407	1,614,585	1,580,168
Goods train mileage run.....	846,110	1,955,781	1,964,129
Mixed train mileage run.....	(b)	(b)	(b)
Total train mileage run.....	1,725,517	3,570,366	3,544,297
Number of passengers carried.....	2,625,772	4,995,441	5,040,471
Number of passengers carried 1 mile.....	98,832,574	173,743,488	186,998,752
Coaching earnings.....	\$1,056,694	\$1,902,903	\$1,974,854
Earnings per passenger carried 1 mile.....	\$0.0100	\$0.0100	\$0.0095
Average ride per passenger..... miles..	37.6	34.8	37.1
Number of tons (of 2,000 pounds) of goods carried.....	438,116	1,555,585	1,855,437
Number of tons of goods carried 1 mile.....	27,733,195	138,238,994	201,538,694
Goods earnings.....	\$542,816	\$1,283,240	\$1,678,066
Earnings per ton of goods carried 1 mile.....	\$0.0196	\$0.0095	\$0.0087
Average haul per ton of goods..... miles..	63.3	88.9	108.6
Average tonnage per train.....	32.8	70.7	102.6
Number of locomotives.....	—	165	160
Number of carriages.....	—	335	337
Number of freight cars.....	—	1,602	1,604

^a The annual reports of the Korean Railways end the fiscal year Mar. 31, and hereafter the previous year will be referred to in this instance as 1915.

^b In 1914-15 the mixed train mileage run was 1,661,282, the passenger train mileage was 1,276,142, and the goods train mileage was 524,292, making a total of 3,461,716.

ORGANIZATION AND OPERATING METHODS.

The organization is of the typical branch or bureau type, being very similar to that of the Shantung Railway (see p. 130); but since the Korean railways are now a section of the South Manchuria Railway this situation will be referred to later in connection with the latter system.

The method of train operation is the typical station-master working, with very little signaling and interlocking, all of which conforms, in general, to the practice on the Japanese railways.

TRAFFIC AND RATES.

For the year 1907 the passenger earnings were practically double the freight earnings. During the interval since that time freight earnings have been growing at a faster rate, until in the year 1915 the freight earnings were practically equal to the passenger earnings. It is the general rule, with all railways in this part of the world, for the passenger earnings to exceed the freight business at first but for the freight business to grow faster and finally exceed the passenger business. This rule, however, does not apply to the South Manchuria Railway, where the freight earnings have always been largely in excess of the passenger earnings.

For the year 1907, with 641.5 miles of line, 2,625,772 passengers were carried. This number was not equaled again until the year 1912, when there was an increase to 4,399,022, with 837 miles of line. On local passenger trains second and third class passengers are handled, and on express trains first-class passengers are handled in addition. The available data do not show the details of the amount of travel or the earnings of these several classes. The average distance traveled per passenger has been a little less than 40 miles since 1906. The average passenger earnings per passenger mile for 1915 were 0.095 cent, which is just slightly less than the average for 1906. In 1907 the earnings increased to 1.22 cents per passenger mile; since then they have gradually fallen and were 0.097 cent in 1914 and as given above in 1915. The goods earnings increased about 210 per cent, with less than 50 per cent increase of mileage, between the years 1907 and 1915, inclusive. The tonnage per train had increased to 102.6, or more than 200 per cent, during this interval, but it still is very low considering the light grades (seldom exceeding 1 per cent) and the heavy motive power and freight equipment on these lines.

Coal constitutes the largest item of tonnage, amounting to about 335,000 tons, or approximately 20 per cent of the total freight handled, for the year 1915. A considerable portion of this comes from the South Manchuria Railway. Rice forms the next largest item and has increased from 63,000 tons in 1907 to 296,000 tons in 1915, or about 400 per cent. Lumber amounting to about 107,500 tons in 1915 is the next largest item, showing an increase of more than 150 per cent from 1907. Beans were the fourth largest item in 1907; the tonnage handled was about 31,500 tons, and in 1915 it was about 88,500 tons—an increase of nearly 190 per cent, 50 per cent of which, however, occurred in 1915. The other freight handled is all of a very miscellaneous character. The mineral traffic, except

that in graphite (8,250 tons), for the year 1915 amounted to only about 4,200 tons.

EARNINGS, EXPENSES, AND PROFITS.

The performance table on page 180 shows that the operating ratio has been reduced from 102.2 per cent in 1906 to 80.1 per cent in 1915, which latter year showed a profit of 1.28 per cent on the capital invested. The change has resulted from a steady growth of traffic, with close attention to operating efficiency, including improvements for increasing the trainload. With the increase of coal mining, the traffic that will result from the iron furnaces, and the general development of the other resources of Korea, there is little doubt that these lines will become increasingly profitable.

EMPLOYEES AND WAGES.

The following table shows the number, nationality, and average compensation of the employees of the Korean railways as of March 31, 1916:

Department and nationality of employee.	Officials of "Sonin" rank.		Employees of "Hainin" rank.		Class A employees.		Class B employees.		Total.	
	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.
Director (engineer in chief): Japanese ("Chokunin" rank)...	1	\$290.79							1	\$290.79
General department: Councilors, Japanese...	2	93.15							2	
Other Japanese...	2	78.51	23	\$30.33	69	\$14.73	87	\$10.93	181	
Koreans...					1	18.94	9	8.36	10	
Total...	4		23		70		96		193	17.16
Traffic department: Councilors, Japanese...	2	165.75							2	
Other Japanese...	8	81.00	151	35.13	774	14.20	975	8.89	1,908	
Koreans...					19	11.92	479	7.20	498	
Total...	10		151		793		1,454		2,408	12.30
Locomotive department: Engineer ("Chokunin" rank)...	1	215.19							1	
Other Japanese...	3	133.77	77	36.05	411	14.24	530	11.13	1,021	
Koreans...					11	10.25	431	6.66	442	
Chinese...							7	9.85	7	
Total...	4		77		422		968		1,471	12.37
Maintenance of way and works department: Japanese...	19	108.21	80	41.14	272	17.91	1,160	12.41	1,531	
Koreans...					6	13.80	1,466	8.82	1,472	
Chinese...							5	8.17	5	
Total...	19		80		278		2,631		3,008	11.57

Department and nationality of employee.	Officials of "Sonin" rank.		Employees of "Hainin" rank.		Class A employees.		Class B employees.		Total.	
	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.	Num-ber.	Average monthly pay.
Financial department: Councilor, Japanese...	1	\$145.29							1	
Japanese...	3	108.57	57	\$37.22	101	\$16.14	63	\$16.90	224	
Koreans...							22	8.77	22	
Total...	4		57		101		85		247	\$22.67
Construction department: Engineer ("Chokunin" rank)...	1	233.26							1	
Councilor, Japanese...	1	157.03							1	
Other Japanese...	3	112.44	9	42.04	4	14.40	3	7.23	19	
Koreans...					1	17.45			1	
Total...	5		9		5		3		22	54.54
Ryuzan workshops: Japanese...	2	127.95	13	37.85	32	20.22	369	16.26	416	
Koreans...							620	7.85	620	
Total...	2		13		32		989		1,036	11.82
Taiden construction office: Assistant secretary, Japanese...	1	157.03							1	
Assistant engineers, Japanese...			9	37.00					9	
Clerks, Japanese...			8	37.64					8	
Other Japanese...					18	18.30	44	13.69	62	
Koreans...					1	15.95	16	6.85	17	
Total...	1		17		19		60		97	19.15
SUMMARY.										
Officials of "Chokunin" rank...	3	246.20							3	
Councilors, Japanese...	6	136.67							6	
Secretaries, Japanese...	6	111.46							6	
Assistant secretaries, Japanese...	8	78.41							8	
Secretary interpreter, Japanese...	1	87.24							1	
Engineers, Japanese...	33	123.68							33	
Assistant engineers, Japanese...			187	39.46					187	
Clerks, Japanese...			287	36.24					287	
Other Japanese employees...					1,755	15.26	3,604	11.93	5,359	
Korean employees...					41	12.26	3,287	7.14	3,328	
Chinese employees...							12	8.31	12	
Total...	57	119.13	474	37.51	1,796	15.18	6,903	9.79	9,230	12.93

From the above table it will be seen that the average monthly wage for all employees is \$12.93 gold, which is \$3.18 gold higher than the average wage for all employees of the Imperial Government Railways of Japan for the same year. The Ryuzan workshops and the Taiden construction office are given as typical situations. The summary includes the other construction organizations and the other workshops—one of the latter at Soryo (near Fusan) and one at Heijyo (Pingyang), having 377 and 177 employees, respectively. Since the date of the above figures there has been some increase in the percentage of both the Koreans and the Chinese employed.

ROADWAY AND TRACK.

The Kei-Gi line from Ryuzan, near Seoul, to Shingishu was hurriedly constructed for military uses during the Russo-Japanese War, but the line has since been substantially reconstructed, with maximum grades of 1 per cent and maximum curves of $4^{\circ} 30'$ and with all structures permanent. While the Kei-Fu line was originally better located and constructed, it has been very considerably reconstructed in accordance with the standards just indicated, and most of this work is now completed. One feature of this reconstruction work has been the raising of the grade at a large number of points where flood water during the rainy season damaged the roadway. In the past that condition caused a great deal of damage, besides delaying the traffic.

The other lines have been built largely on the final location, but it is the general practice to put in temporary structures and after the line is in service to put in the permanent structures and to lift the grades sufficiently to overcome the washing-out tendency just mentioned.

The location of all lines is through fairly rough country for railway construction, and this fact, with the standard of construction followed, has made the lines moderately expensive. A very considerable amount of tunneling has been required, particularly on the main lines, to get the 1 per cent grade; some parts of the Kei-Gi line required a great deal of tunneling and heavy rock work.

About 235 miles of track is laid with 65-pound rail, and all the remainder is laid with 75-pound rail. The general details of track work conform very closely to the practice of the Imperial Government Railways of Japan. Parts of the line are ballasted with broken stone, and the remaining parts with good gravel, some of which has been screened. The ties are an assortment of Japanese hardwoods, Japanese oaks, and timbers from northwestern Chosen.

LOCOMOTIVES.

Of the 165 locomotives constituting the equipment March 31, 1916, 94 were of the tank and 71 of the tender type; of the latter 9 were superheaters. A very large percentage of these locomotives are of American manufacture, although a number of the latest and largest were built at the Shakako works of the South Manchuria Railway at Dairen. These locomotives are of the 4-6-0 type, and weigh complete with tender, in working condition, about 240,000 pounds, with 120,000-pound drivers. The cylinders are 21 by 26 inches, the diameter of the driving wheels is 54 inches, the boiler pressure is 180 pounds, and all the engines are of superheater type. The South Manchuria Railway now has an order in America for 24 locomotives, a number of which are probably for the use of the Korean Railways.

PASSENGER CARS.

The carriage equipment consists of first, second, and third class day coaches, as well as sleeping, dining, mail, and baggage cars, for the handling of both the through and the local business. The largest item of the equipment consists of 134 third-class cars, with four-wheel trucks, which seat 100 passengers per car. The next largest

items are 47 second and third class cars, each seating 86 passengers, and 47 baggage and brake composite cars. A very large percentage of this equipment is also of American manufacture, but the tendency in recent years has been to manufacture this class of equipment in the Ryuzan shops or to obtain it from the Shakako works at Dairen.

FREIGHT CARS.

The freight equipment is divided between open and covered cars, of which 557 are of the covered or box car type; 378 of these are of typical American construction with air brakes, 46 are goods vans with air brakes, and 24 are cattle cars with air brakes. Of the remainder of the freight equipment only about 10 per cent is equipped with hand brakes.

With the exception of four water-tank cars the remainder of the freight equipment consists of open cars, of which 78 are coal cars, 608 miscellaneous gondolas, and 342 small four-wheel wagons, which have been mostly used for construction work.

There is very little special work equipment. In the past work equipment has been little used, hand labor being depended upon, but with the growth of business it would appear that special work equipment, particularly wrecking cranes, will become more necessary in the future.

From the above it will be noticed that there were 0.194 locomotives and 0.336 passenger cars of all classes and only 1.60 freight cars, including work equipment, per mile of line on the Korean Railways March 31, 1916. Therefore the statement seems warranted that the growth of business to be expected in the next few years will inevitably require additional rolling stock. It is not probable that the existing condition will be in any measure relieved by the consolidation of the management with that of the South Manchuria Railway, which has no surplus equipment to take care of its steadily growing business.

WORKSHOPS.

The main shops of the Korean Railways are located at Ryuzan, in close proximity to the general administration buildings, less than 5 miles from Seoul. There are also division workshops at Soryo, about 5 miles from Fusan, employing ordinarily from 375 to 400 men, and at Heijyo (Pingyang), employing from 175 to 200 men. The requirements at Antung are taken care of in the South Manchuria district shops at that point.

The Ryuzan works are well arranged and fairly well equipped with modern shop machinery, a large amount of which is from American sources. The number of men employed varies from 1,000 to 1,200, the usual number being about 1,100. In recent years an increasing number of Koreans have been employed as artisans and laborers. When the writer visited the works in July, 1917, slightly more than 70 per cent of the 1,100 employees were Koreans or Chinese—a considerable increase, it will be noted, over the number shown by the table on page 183 for March 31, 1916.

These shops are arranged to take care of all classes of repairs on the rolling stock of the Korean Railways, besides handling a very considerable amount of manufacturing of railway requirements for all departments. In addition, at the Ryuzan works a small number

of passenger and freight cars are being constructed, the necessary parts being purchased where they can be obtained to the best advantage.

OFFICIALS—PURCHASES.

The directory of the principal officials will be included under the Korean section of the South Manchuria Railway Co. (see p. 272).

In the early days of the construction of the Korean Railways a large part of all the requirements was supplied from American sources, and a substantial part is still being so purchased when the articles are thus obtainable; but the operation of the Korean Railways has been very similar to that of the Imperial Government Railways of Japan and, so far as is practicable, equipment and supplies are obtained from Japanese sources, the amount increasing from year to year. Moreover, there is a great tendency to secure supplies from America through large Japanese commercial and engineering concerns, such as the Mitsui Bussan Kaisha, Takata & Co., Okura & Co., and similar concerns, all of which have well-staffed branch offices in Seoul. The policy, it is said, is to allow the Stores Branch in Seoul to purchase directly such materials as can be obtained through the local representatives, but large general purchases will ordinarily be handled through the general purchasing office of the South Manchuria Railway at Dairen.

III. KOREAN LIGHT RAILWAYS AND TRAMWAYS.

INTRODUCTION.

The Korean light railways and tramways are of considerable importance. The following is a reference made to the subject in the annual report of the railway bureau of the Governor General of Chosen for the year ended March 31, 1916:

The light railways and tramways sanctioned and constructed during the old Korean administration were transferred to the superintendence of the Government General of Chosen in October, 1910; the lines open to traffic at the time reached only 20 miles, while a length of 15 miles was still unopened. Before that time there was no law applying to these lines, so one was then issued concerning light railways in Chosen and supplementary laws were issued in June, 1913. Since the fiscal year 1914 an annual subsidy of 6 per cent has been allowed to companies planning to lay down and work light railways according to the law, so as to assist and encourage the development of the work.

The policy and tendency seem to incline decidedly toward the building of trunk and important branch lines as part of the government system of standard-gauge railways and the building of light railways or tramways as a means of developing the country. This latter class includes tramways in the cities and industrial lines, particularly in the development of the mineral resources of Chosen. All these lines are considered as forming one general class, but they can be subdivided into the lines handling general traffic (including the city passenger tramways) and the lines that do not handle general traffic. These last receive no subsidies and are termed private lines. On March 31, 1916, there were 64.9 miles of general-traffic lines of all classes and 46.9 miles of industrial lines, making a total of 111.8 miles. On this same date there were under construction 144.4 miles of the former and 21 miles of the latter, a total of 165.4 miles. In addition, there is projected a very considerable mileage of both classes, which will be built in the course of time.

There has been a great deal of difficulty in obtaining the necessary materials for constructing these lines and the rolling stock to operate them, especially since the exhaustion of the supply of 2-foot-6-inch-gauge equipment from the Antung branch of the South Manchuria Railway, and it is very probable that the construction of the new lines will be materially retarded until prices become more nearly normal.

For the year ended March 31, 1916, the revenues from the 64 miles of commercial lines amounted to \$222,006 and the expenses totaled \$153,696, leaving a profit of \$68,310. The paid-up capital of these lines amounted on this same date to about \$3,537,000, and in addition there seemed to be about \$1,242,500 of other debts, making the outstanding capital obligations nearly \$4,800,000. The construction cost and purchasing price of these lines on the same date totaled \$4,202,275, which apparently is considered the equivalent of the construction cost. The profits for the year 1914 showed only about

1.1 per cent return on this cost and in 1915 about 1.6 per cent, allowing for some increase of capital obligations, details of which are not shown. It is not stated on what lines the 6 per cent subsidy is guaranteed, but, with the partial information at hand, the earnings seem to show that the rate of return was about the same for all the lines, which would indicate the payment of a subsidy of 4 to 5 per cent on such lines as are guaranteed. This applies to both 1914 and 1915.

Following are very brief references to some of the lines on which the writer obtained information.

KEIJO (SEOUL) ELECTRIC CO.

The Keijo Electric Co. is the most important concern of its kind in Chosen; its operations include the supplying of commercial electricity and gas for the city and suburbs of Seoul (called Keijo by the Japanese). The company was originally owned by American interests, but some years ago was purchased and taken over by Japanese capital. After the company was taken over it was first known as the Nikkan Gas & Electric Co., but the name was recently changed to that just given. The present paid-up capital is \$2,542,350, with other capital obligations amounting to approximately \$1,000,000.

There are 16.6 miles of route, with 28.6 miles of all track, all of which is of 3-foot-6-inch gauge. Details of the earnings were not available, but sufficient data were obtained to indicate that while the gas and electric operations may be profitable the tramways are not carrying their part of the interest and dividend charges.

There is one power house for the general supply of current, with one substation in addition for the conversion of tramway power. The rolling stock consists of 79 motored passenger cars, 6 motored and 6 trailer goods cars, and 2 sprinklers. This rolling stock, including trucks and electric equipment, is largely of American manufacture. When the writer visited Seoul in July, 1917, there were 6 new cars under construction in the company's own workshops, the equipment for which had already been received from America. It was desired to build more cars, but these were held up on account of the difficulty in obtaining equipment and the high prices prevailing.

The track is all laid with 60-pound T-rail. A considerable part of the special work is of American manufacture, including some hardened parts.

The head office of this company is at Tokyo, Japan, but Mr. I. Murao (Japanese) is chief engineer, located in Seoul, and has general charge of the tramways, including the handling of purchases that are made locally. Many of these are from the strong Japanese commercial and engineering branches in Seoul, as referred to in connection with the Korean railways.

ZENHOKU LIGHT RAILWAY CO.

The Zenhoku Light Railway Co. has 15.5 miles of light railways of 2-foot-6-inch gauge, connecting with the Konan branch at Riri and extending to Zenshu, where the head office is located. The paid-up capital of this company is \$146,335, with about \$25,000 of other capital obligations. General commercial traffic is handled. The line

has a small amount of equipment, consisting of 2 locomotives, 6 passenger cars, and 12 covered and 9 open goods wagons.

KOREAN GAS & ELECTRIC CO.

The Korean Gas Co. now has 12.8 miles of electric tramway, of 2-foot-6-inch gauge, at Fusan, including a line to the Torai Hot Springs. This same company operates the commercial electric and gas business at Fusan. The company now has \$675,000 in capital shares outstanding, with about \$200,000 of other capital obligations.

KANKO COAL MINING CO.

The Kanko Coal Mining Co. operates 8.8 miles of steam line, of 2-foot 6-inch gauge, handling general commercial traffic, though the principal use of the line is the transporting of this company's coal to the port of Seikoshin. The issued share capital is about \$150,000. The head office is at Kanko.

KOREAN LIGHT RAILWAY CO.

The Korean Light Railway Co., with head office at Fusan, has in course of construction four or five steam lines amounting to about 115 miles of 2-foot 6-inch gauge. These lines are all in southern Chosen, in the general vicinity of Fusan, and about 25 miles are now practically complete. From the information obtainable it appears that this company has additional mileage projected. It is one of the concerns whose lines will be built under the 6 per cent subsidy.

This same company has another electrified line of about 12 miles, of 2-foot 6-inch gauge, under construction from the port of Seishin, in the northern part of Chosen, to Ranan, on the Kyojo-Kwaimei military railway. From all appearances this concern is likely to take a very active part in building subsidized light railways and tramways in all parts of Chosen.

INDUSTRIAL TRAMWAYS.

The various mining concerns have, as a rule, built and operated the industrial tramways for the handling of ores and fuel.

The Mitsui Mining Co., of Tokyo, owns and operates the longest line—18.5 miles of steam railway, of 2-foot 6-inch gauge, between Shinanshu and Kaisen, a short distance north of Pingyang (Heijyo).

Mitsubishi & Co., of Tokyo, have under construction two steam lines, one of 10.3 miles and the other of 3.9 miles, both of 2-foot 6-inch gauge, and one electric line of 6.8 miles, of 2-foot 6-inch gauge. These are all for the transportation of ore.

M. Komiya, of Fusan, has 12.2 miles of man-power line, of 2-foot 6-inch gauge, for the transportation of ore between Kokan and Tokusuri, and there are a number of other small lines. Mining development will probably bring about considerable additions to the number of these small industrial lines.

Part 4.—MANCHURIA.

I. GENERAL INFORMATION.

Most of the features of Manchuria involving the transportation situation have been covered in connection with the general features of China. It therefore seems necessary only to list the five railways that now exist and to call very brief attention to the products of Manchuria so far as these involve railway transportation. In connection with these railways one feature that will probably be of much importance in the future development of Manchuria, and has in the past been of considerable magnitude, is the shipping on the Amur and its tributaries, of which the Sungari is the most important. The Amur River drains an area of many thousand square miles of rich country suited to both agricultural and pastoral products and probably containing considerable mineral resources, of which at the present time gold is the most important product.

The five railways in Manchuria are as follows: South Manchuria Railway Co., 692 miles; Kirin-Changchun Railway, 80 miles; Sipingkai-Chengchiatun Railway, 52 miles; Chinese Eastern Railway, 1,078 miles; Tsitsihar Light Railway, 17 miles; total, 1,919 miles. The first three lines are all of 4-foot 8½-inch gauge. The Chinese Eastern is of Russian standard 5-foot gauge, and the Tsitsihar of meter gauge. The second and third lines, although nominally Chinese Government railways, are actually feeder lines to the South Manchuria Railway and are largely under the control of the latter.

The soya bean is produced in great quantities in all of southern and central Manchuria. Millet is grown in its several varieties, of which kaoliang is the most important; its grain is used for food, the stalk is stripped for fodder, and the stalk and roots are used for fuel. In central and northern Manchuria the pastoral products are important. Lumber is brought down the Sungari River in considerable quantities, particularly to Kirin, from which place it is shipped by rail to points on both the South Manchuria and the Chinese Eastern Railways.

Much the larger part of the population of Manchuria is located in the southern and central portions. It is estimated that about 75 per cent is located in the general region served by the South Manchuria Railway. This territory was and is now served by the native craft on the Liao River, which lies west of the main line of the railway from a point about 75 miles southwest of Changchun (to which point it flows out of the northeastern part of Mongolia) to the head of the Liaotung Gulf. In the past, during the navigation season a great amount of traffic was carried by the craft plying this stream. This business was carried to Newchwang, where it was taken up by ocean-going ships. One of the handicaps in this system of transporta-

tion is that the agricultural products can best be transported to the river ports during the winter, but the river and the port of Newchwang can be navigated only during the open season of about six months; this means the storing of large quantities of soya beans and grain during the spring months. The handling of this traffic by railway has made a great improvement in the situation, in that the grains can be transported immediately to the ice-free port of Dairen. This has resulted in the loss by Newchwang of much of its commercial importance since the completion of the railway and the opening of the port of Dairen.

II. MANCHURIAN RAILWAYS.

SOUTH MANCHURIA RAILWAY CO.

INTRODUCTION—EXTENT OF LINES.

The South Manchuria Railway Co. is one of the most interesting and instructive developments in this part of the world. The conclusions that can be drawn from the working results are particularly significant as to what can be accomplished by similar methods in other parts of the Far East, and attention will be called later to some of these points.

The main line extends northwestwardly from the port of Dairen (formerly called Dalny) to Changchun, a distance of 437.6 miles, of which 238.4 miles at the southern end is double tracked. At Changchun connections are made with the Harbin-Changchun branch of the Chinese Eastern and with the Kirin-Changchun line of the Chinese Government railways. At Ssuningkai connection is made with the Ssuningkai-Chengchiatun line extending northwestwardly toward northeastern Mongolia. The Mukden-Antung line leaves the main line about 5 miles south of Mukden and runs in a southeasterly direction to Antung, a distance of 170.8 miles, where connection is made with the Korean railways. In addition, there are important branches, as follows: To the Fushun coal mines, 30.9 miles; to Newchwang (Yingkow), 13.9 miles; to Port Arthur, 28.9 miles; to the Yentai coal mines, 9.7 miles—a total of 981.8 miles, not including the Liushutun branch of 3.5 miles.

At the present writing no extensions of the South Manchuria lines are contemplated, but the proposed extensions of the Kirin-Changchun and the Ssuningkai-Chengchiatun lines will, for all practical purposes, effect extensions that will act as traffic feeders to the South Manchuria system. There has been much discussion concerning the possible acquiring by the South Manchuria Co. of about 75 miles of the southern end of the Harbin-Changchun branch of the Chinese Eastern Railway, which would give access to the Sungari River and, by means of river transportation, to all of the Sungari and Amur River ports. This would be a very valuable acquisition, and would probably add a substantial volume of traffic to both outbound and inbound shipments.

As the South Manchuria Railway Co. is not only an organization for the maintenance and operation of this railway property but is also a very efficient means by which the Japanese Government maintains and operates an investigation, development, manufacturing, and transportation organization in Manchuria and Chosen, it is probable that additional branch lines will be built for the future development of the country.

FINANCIAL STATISTICS—OPERATING RESULTS.

The tables following present financial statistics and operating results of the South Manchuria Railway and its outside undertakings; values are expressed in gold.

WORKING RESULTS FOR YEAR ENDED MAR. 31, 1916.

Items.	Capital investment.	Receipts.	Operating ratio.	Expenses and deductions.	Profit and loss.
			Per cent.	Expenses.	
Main line railway.....	\$24,750,692	\$10,919,310	31.6	\$3,416,817	\$7,472,493
Mukden-An-tung railway.....	12,234,125	991,952	83.6	628,183	363,769
Total railway.....	36,984,817	11,911,262	34.2	4,075,000	7,836,262
Steamships and floating equipment.....	2,517,281	631,330	93.2	608,237	23,095
Tramway and electrical equipment.....	2,503,321	578,397	61.4	360,770	217,627
Mines.....	8,719,638	6,305,088	84.1	5,304,475	1,000,613
Harbors and wharves.....	6,010,743	1,142,920	83.9	937,976	184,944
Gas plants.....	712,919	122,070	55.0	67,198	54,872
Workshops.....	3,198,363	1,013,474	120.3	141,252	-23,828
Hotels.....	1,013,474	756,643	1,242,150	-485,508	
Land.....	5,405,347				
Land improvements.....	2,360,793				
Sundry buildings.....	5,843,612				
For property taken over from the Japanese Government in 1907.....	49,850,000				
Sundry receipts and losses.....		72,394		346,717	-294,323
General expenses and interest on bank deposits.....		189,805		1,582,296	-1,372,491
Total.....	125,924,310	21,827,334	67.3	14,686,071	7,141,263
Interest on debentures.....				Deductions:	
Writing off discount on debenture issue.....				\$2,774,108	
Total deductions.....				338,027	
Profit for year.....				3,113,135	4,028,128
6 per cent dividend on subscribers' shares.....				777,660	
2 per cent extra dividends on subscribers' shares.....				259,220	
Dividends on Japanese Government shares.....				1,246,230	
Special reserves.....				1,246,230	
Reserve prescribed by law.....				201,407	
Bonus to officers.....				149,550	
Total income deductions.....				3,880,337	
Balance for year carried to surplus.....					147,791

PERFORMANCE STATISTICS FOR YEAR ENDED MAR. 31, 1916.

Items.	Main line.	Mukden-An-tung line.	Total for year.
Miles of line open.....	521.0	170.8	691.8
Miles of all tracks.....	796.8	225.9	1,022.7
Number of train miles run.....	3,957,774	747,760	4,705,534
Number of locomotive miles run.....	4,570,900	789,977	5,360,877
Number of vehicle miles run.....	76,206,843	8,885,904	85,092,747
Number of passengers carried.....	3,200,587	567,977	3,768,564
Number of passengers carried 1 mile.....	233,567,100	21,694,846	255,261,946
Coaching earnings.....	\$2,185,453	\$228,453	\$2,413,906
Earnings per passenger carried 1 mile.....	\$0.00877	\$0.00950	\$0.00883
Average ride per passenger, miles.....	73.0	38.2	68.8
Average number of passengers carried per passenger train mile.....	192	59	167
Number of tons of goods carried.....	6,053,103	1,300,734	7,443,837
Number of tons of goods carried 1 mile.....	1,173,834,992	112,487,947	1,286,322,949
Goods earnings.....	\$7,908,392	\$606,045	\$8,514,437
Earnings per ton carried 1 mile.....	\$0.00673	\$0.00614	\$0.00668
Average haul per ton of goods, miles.....	193.9	80.9	172.8
Average number of tons of goods hauled per goods train mile.....	371	215	352
Yearly working receipts per mile of open line.....	\$20,950	\$5,808	\$17,232
Yearly working expenses per mile of open line.....	\$6,616	\$3,678	\$5,800
Yearly operating income per mile of open line.....	\$14,343	\$2,130	\$11,212
Yearly transportation and traffic expense per mile.....	\$3,584	\$1,674	\$5,115
Yearly maintenance of equipment expense per mile.....	\$1,163	\$615	\$1,927
Yearly maintenance of way expense per mile.....	\$1,626	\$1,298	\$1,541
Yearly general railway expense per mile.....	\$243	\$91	\$204
Total yearly expense per mile.....	\$6,616	\$3,678	\$5,800

RECEIPTS, EXPENSES, AND PROFITS FOR FOUR YEARS ENDED MAR. 31.

Items.	1907-8	1914-15	1915-16	1916-17
Total railway revenues.....	\$6,249,765	\$11,573,536	\$11,911,262	
Total railway expenses.....	\$2,572,962	\$4,160,125	\$4,075,000	
Profits from railway operations.....	\$3,676,803	\$7,413,411	\$7,836,262	
Operating ratio..... per cent.....	41.2	35.9	34.2	
Total receipts from all sources.....	\$8,781,418	\$22,268,302	\$21,827,334	\$23,272,671
Total expenses of all kinds.....	\$7,727,797	\$18,509,068	\$17,799,296	\$21,233,984
Total net profit from all sources.....	\$1,053,621	\$3,759,234	\$4,028,128	\$5,038,687

ROLLING STOCK.

Items.	1915	1916	1917
Number of locomotives.....	267	267	270
Number of passenger cars.....	213	213	219
Number of freight cars.....	3,067	3,186	3,194

TRAMWAY EQUIPMENT.

Items.	1917	Items.	1917
DAIREN TRAMWAYS.		FUSHUN TRAMWAYS.	
Miles of line open.....	25.58	Miles of line open.....	48.56
Number of passenger cars.....	50	Number of electric locomotives.....	11
Number of motored freight cars.....	10	Number of passenger cars (motored).....	3
		Number of freight cars (for carrying sand).....	185
		Number of steam shovels.....	9

OUTSIDE UNDERTAKINGS.

In addition to its railway mileage, the South Manchuria Railway Co., as indicated in the above tables, owns and operates outside undertakings, with a capital investment of about \$40,000,000, not including the value of the concessions and property turned over by Russia at the end of the Russo-Japanese war.

The railway company maintains a research department with a central laboratory and a geological laboratory. The central laboratory has eight divisions, as follows: Analytical and applied chemistry; tussah filature; dyeing and weaving works; ceramic; brewing; hygienic; electrochemistry; and experimental bean mill. The laboratory aims at pursuing the study, from both the scientific and the commercial point of view, of the analysis of coal and iron ores in Manchuria, the employment of clay and siliceous stone as materials for glass making, the method of manufacturing salt, the uses of beans, the manufacture of pulp for paper from kaoliang stalks, the distilling of kaoliang spirit, the reeling of tussah silk, and the potentialities of the botanical products of Manchuria.

The geological laboratory is intended mainly for the investigation and analysis of the soil, mineral products, etc., in Manchuria and Mongolia, the surveys of which from a geological point of view have been practically concluded. A geological map and a pictorial table of mineral products of Manchuria are in preparation, and careful search is being made for all mineral products, particularly coal and iron.

By further reference to the table on page 194 it will be seen that the mines, tramways and electric plants, harbors and wharves, and gas plants are showing reasonable profits. The hotels are operated at a small loss. The land operations show a loss, probably on account of certain enterprises that are undertaken for the development of the country. The largest item of loss is the one of general expense, which includes the investigations and developments going on in the research department and other similar expenses that are not being allocated to the various enterprises directly.

In addition to those mentioned above, further developments are under way, among the most important of which are the two 250-ton blast furnaces now in course of construction at Anshan, where later it is planned to erect a complete steel plant, particularly for the manufacture of ship plates and similar materials. In this general connection it may be mentioned that the Kawasaki Dockyards Co., of Kobe, has a shipbuilding plant at Dairen, and there are a number of other growing industries at this point, representing entirely Japanese enterprise and capital.

HISTORICAL SURVEY—ORGANIZATION.

A detailed history of the South Manchurian branch of the Chinese Eastern Railway and the South Manchuria Railway Co. since its acquisition by the Japanese would be entirely too long to be included in such a report as this, but the principal facts will be briefly stated. The line from Harbin to Port Arthur and Dairen was built by Russia under the terms of the supplemental agreement shown in appendix No. 2. The track was all standard Russian 5-foot gauge. One result of the Russo-Japanese war was the surrender of the line south of Kwanchengtze, a point about 2 miles north of Changchun, to Japan. The field railway department of the Japanese Army administered the property until April 1, 1907, on which date the railway and all the outside undertakings, including the coal mines, were turned over to the company, which had already gone through the following formative process: On June 7, 1906, an imperial ordinance (No. 142) was issued concerning the establishment of the South Manchuria Railway Co., and on July 13 of the same year Gen. Viscount G. Kodama was appointed president of the organization committee, composed of 80 members. But, in consequence of the death of Viscount Kodama, which occurred on July 24, Viscount Terauchi, Minister of War, assumed the presidency on July 25.

On August 1 the Government forwarded to the committee the conditions pertaining to the establishment of the South Manchuria Railway Co., and after the formation of the company had been prepared by the committee on the basis of the imperial ordinance and in accordance with the conditions of the Government, the articles of association were approved by the Government on August 18. The authorized share capital was 200,000,000 yen, par value of shares 200 yen. The right to hold shares was limited to the Imperial Japanese Government and the Imperial Chinese Government, now the Republic of China, and subjects of these two countries. It is probable, however, that very few, if any, of the shares were ever held by Chinese. For the property turned over, the Imperial Japanese Government received a total of 500,000 fully paid-up shares, or 50 per cent of the total amount authorized. The subscribed stock

under the provisions of several articles is granted 6 per cent dividends, and in June, 1914, a revision of the articles of association permitted the payment of an additional 2 per cent if 2 per cent was paid on the Government shares. At least one-twentieth of the net profits are to be set aside as a reserve fund until this has reached one-quarter of the authorized capital, and dividends on the Government shares are limited to 5 per cent per annum. Instead of paying this amount it appears to be the general policy to retain an amount equal to the dividend paid on Government shares, usually $2\frac{1}{2}$ per cent, in the form of a special reserve. In addition, the Imperial Government of Japan guarantees interest on debentures, of which there are now outstanding £12,000,000 (\$58,398,000 gold), one-half paying 5 per cent interest and the other half $4\frac{1}{2}$ per cent. The articles of association limit the amount of debentures that may be issued to double the authorized outstanding capital shares, including those held by the Government.

The board of directors was originally composed of a president, vice president, and at least four directors, with from three to five auditors, but the recent reorganization, now in effect, provided for a board of directors with a director in chief and four directors at Dairen and one director at Tokyo, as shown by the directory given on page 270. The president and vice president formerly were, and the director in chief now is, appointed by Imperial sanction. The directors are appointed by the Government from among the shareholders and the auditors are elected by the shareholders.

Baron Y. Goto was appointed president, Mr. Z. Nakamura vice president, and Mr. S. Kunisawa leading director in November, 1906. In July, 1908, when Baron Goto was appointed Minister of Communications, Mr. Nakamura was raised to the presidency and Mr. Kunisawa promoted to the vice presidency, both of them remaining in office until December, 1913, when they were succeeded by Dr. Nomura as president and Mr. D. Ito as vice president. They in turn retained office until July, 1915, when they were succeeded by Lieut. Gen. Baron Y. Nakamura as president and Dr. Kunisawa as vice president. This arrangement continued until the reorganization and consolidation with the Korean railways; at that time Baron Nakamura retired and Dr. Kunisawa is now director in chief.

On July 31, 1917, the administration of the Korean railways was consolidated with that of the South Manchuria Railway Co., but since that time the organization has been modified in several ways until it is now as indicated by the directory (see p. 270); it is complete for handling not only the railway operations but all the outside undertakings as well. The administration of the Korean railways is known as the "Korean section."

The working of this entire arrangement seems to be very satisfactory, and, in view of the growing financial success from year to year, it would certainly appear that the organization methods of the South Manchuria Railway Co. can be studied with much benefit in relation to their bearing on other similar situations in the Far East. While this organization conforms to the departmental system characteristic of government railways, and there is not a distinct commercial department, there is nevertheless a close and thorough study of the traffic, including the means of meeting developing conditions. This last is a special feature of the selling of transportation in any part

of the world, but is the one most frequently lacking in the government operation of railways.

OPERATING METHODS.

The method of train running conforms strictly to the station-master system already referred to in connection with the Japanese railways. All signaling is along the lines of the British Board of Trade practice and is all very limited, both for signals and interlocking. The same remarks concerning modern methods of signaling and selective telephone apparatus for central control apply here as in connection with the Imperial Government Railways of Japan.

CONSTRUCTION COSTS AND CAPITAL INVESTMENT.

The tables on page 194 show the general statistics for the main line and branches as one group and for the Mukden-Antung line as another group, with a summary for the whole, for the year ended March 31, 1916. In the column "Capital investment" the item of \$49,850,000 represents the valuation put on the property taken over from the Russian Government at the end of the Russo-Japanese War, and in this is included all the other property rights and concessions as well as the railway, which had been changed from the Russian 5-foot gauge to the Japanese 3-foot 6-inch gauge during the war. This also included the 2-foot 6-inch gauge military railway, which has since been reconstructed into the Mukden-Antung line. There apparently has been no effort to allocate to the different undertakings the division of this valuation of the original property.

The other items in this column show the capital expenditures on the various undertakings. The railway expenditures include the expenses incurred in changing the main line and branches from 3-foot 6-inch to 4-foot 8½-inch gauge and the reconstruction of the Mukden-Antung line into the present standardized gauge, which involved the practical rebuilding of this entire line, mostly on new location. Without attempting to allocate the original property the capital investment of the main line averages \$47,505 per mile of line and of the Antung line \$71,630, or \$53,460 per mile of line for the entire system. Outside of the Dairen and Port Arthur harbors and towns there was not a great deal of actual property other than that of the railway, and while the mining concessions were of great value there was very little actual plant when the Japanese acquired the property.

The mining plant at the Fushun coal mines is modern and up-to-date in every respect and has been installed entirely by the South Manchuria Railway Co. These same remarks apply to the other undertakings of this most excellently equipped property, especially the Shakako workshops and the Dairen tramways and electric light and gas plants.

TRAFFIC AND RATES.

The South Manchuria Railway is one of the exceptions in this part of the world to the rule that passenger earnings at the start exceed freight earnings. The freight earnings of the South Manchuria Railway have always largely exceeded the passenger earnings.

The performance statistics show passenger earnings per mile as less than 0.9 cent and average earnings per ton mile of freight as less than 0.7 cent, with the very low rate of 0.625 cent on the Antung

line—this latter condition probably being due largely to the preferential rates for freight via the Korean Railway and this line on shipments between Japan and China, in connection with which there is a reduction of one-third of the usual Chinese customs duties when the goods enter Manchuria at Antung.

Passenger fares, while called first, second, and third class, were in reality, first, third, and fourth class, and the rates formerly were 6, 2.7, and 1.8 sen per mile, but in October, 1917, these were changed to 5, 3.5, and 2.8 sen for first, second, and third class passengers, and there was established what is the equivalent of the coolie fare on some of the Chinese railways.

While the freight handled is very varied, coal constitutes the largest single item, amounting to about 2,500,000 tons from the Fushun and Yentai mines and about 300,000 tons from the Penchihiu mines. The next largest and most important item for the country as a whole is the soya bean and its products.

One feature that is being worked out with particular care is the warehousing of goods, both imports and exports. This feature was taken in hand under orders from the Japanese Government in October, 1908, and while it was fairly well handled at Dairen it was not well provided for at the other stations along the line. Improvements, however, were made from time to time. In September, 1911, regular warehouses were established at Dairen, and since then 25 or more subordinate warehouses have been established along the line and an arrangement has been instituted for insuring the stored goods. This has had a very beneficial effect on the general commercial business of this entire region.

EARNINGS, EXPENSES, AND PROFITS.

The table on page 195 shows that, with an increase of about one-third in the mileage (almost entirely on account of the opening of the Antung line), the earnings have almost doubled during the nine-year period from 1907 to 1915, inclusive. During this same period the operating ratio was reduced from 41.2 to 34.2 per cent, profits from the railway operation more than doubled, and the results from all sources increased nearly five times; at the same time increased amounts were set aside for special revenues. The detailed results for 1916 are not available, but for that year the amount retained for discount of debentures was double that for the previous year, and an 8 per cent dividend was paid to the shareholders. The special reserve fund on March 31, 1917, was \$7,926,150, while the amount actually required by law is only \$1,113,727. During the period above mentioned, substantial improvements have been made in the condition of the property.

From these performance figures it is quite obvious that, notwithstanding the amounts being expended in developing the outside undertakings, this corporation, as a whole, is becoming very profitable. The area served is not at all densely populated as conditions go in the Far East, and this part of the country is of only the average productiveness for China. Therefore one seems warranted in calling attention to these results as an example of what can be accomplished by ably operated railways in other parts of China.

RESULTS OF OUTSIDE UNDERTAKINGS.

The outside undertakings of the corporation are of great importance. It is difficult to determine the order of their importance, but at present the coal mining is probably first (as shown by the table on page 194) and is now returning the largest profit. The shipping lines, harbors, wharves, tramways, electricity and gas plants, and workshops are all very important, and one of the important future developments will be the iron mining and smelting and the steel manufacture for which plants are now in course of construction. While the land enterprises show a loss from operation, it is largely through this medium that the agriculture of the country is being improved.

The tramways include only those at Dairen and Fushun, and the only gas plant is at Dairen. The electrical undertakings include the furnishing of commercial electricity at Dairen, Mukden, Changchun, Antung, and Fushun, with others contemplated. The hotels are those at Dairen, Hoshigaura, Mukden, and Changchun, and the four Korean Railway hotels at Seoul, Fusan, Shingishu, and Diamond Mountain. The land department includes the management of the railway area. The company, while assuming the obligation of providing the necessary arrangements for education, public works, hygienic welfare, etc., in the railway area, was, on the other hand, empowered by the Government to collect a house rate and other necessary assessments from the residents in the railway area—subject to the Government's sanction—in order to recoup the outlays.

In 1907, when the company took up the management of the railway area, there were settlement councils at various centers along the railway. The company thought it expedient to utilize them to act as its agents, but discontinued their experimental utilization in October of the same year. The company established, instead, district agencies at Liaoyang, Mukden, Changchun, and four other places. At present district agencies are maintained at the following 11 railway towns: Dairen, Wafangtien, Tashihkiao, Liaoyang, Mukden, Tiehling, Kaiyuan, Kungchuling, Changchun, Penchihu, and Antung. In addition, there are model industrial towns at the Shakako workshops and the Fushun mines. Eleven other towns are being added, some of which are now well toward completion.

This administration includes the operation of markets, slaughterhouses, vegetable farms, various kinds of welfare establishments, hospitals, sanitation and fire departments, amusement parks, and very complete arrangements for the schooling of all Japanese children in the railway area. In brief, conditions are made as attractive and as profitable as possible for the Japanese employees in the administration and operation of all the railway company's undertakings. The environment of the Japanese section of the mining town of Fushun is probably equal, if not superior, to that of any other place in the world where nearly 7,000 tons of coal are mined per day; this condition is particularly noticeable when compared with that at the coal-mining centers in Japan.

EMPLOYEES AND WAGES.

The writer was not able to obtain information that would make possible such an analysis of wages as was given for the Japanese and the Korean railways. On March 31, 1915, there was a total of

22,833 officials and railway and general employees (this does not include such enterprises as the Fushun mines). Of these 4,714 were officials and 18,119 were termed employees. Of the latter, 8,443 were Japanese and 9,676, or more than 53 per cent, were Chinese. In the 1915 number of a small publication put out by the South Manchuria Railway the following significant statement is made: "Chinese coolies are being hired in place of Japanese laborers for the dual reason that the former cost less and are more convenient in dealing with Chinese customers." In July, 1917, more than 70 per cent of the employees of the Shakako works were Chinese, none of whom were employed in the administrative, technical, or "overhead-expense" positions. The writer was informed that the percentage of Chinese in the wage positions had materially increased since March, 1915. It is safe to say, however, that the wage employees are not paid any higher, and are probably paid lower wages than similar employees on the Korean railways. One reason for this is the larger percentage of natives employed on the Manchurian railways. At the Fushun mines before the war, the daily wage of the Chinese miners and laborers averaged 25 gold sen (equal to 12½ cents United States currency) per day. It is now 30 gold sen, and while this is an increase in the railway area of Manchuria where Japanese money is the prevailing currency, outside this area it is not actually equivalent to the former wages on account of the increased price of silver in the last two years.

The writer made an effort to compare the wages in the Dairen shops with those in the Tangshan shops of the Chinese Peking-Mukden Railway, and his conclusions were that the wages of artisans and laborers were practically on a par in the two establishments, although in some respects the Tangshan shops probably pay higher wages.

ROADWAY AND TRACK.

The country traversed by the main line has no particular difficulties for railway building, and the line is of low grade, well located, and substantially built with permanent structures. The bridges are capable of carrying heavy equipment; the track is laid with heavy rail well tied and ballasted mostly with broken stone. The Mukden-Antung line runs through a much rougher country than the main line, and the location and construction were more difficult and expensive; it is, however, well located and substantially constructed, and while some temporary locations were first used these have been largely replaced by reconstructed line, most of which has now been completed. There are 24 tunnels on the line, the longest being about 4,900 feet and the second longest about 3,250 feet. A great deal of bridging was required for the line, there being a total of 205 bridges and 213 culverts.

There is also a very considerable tendency toward standardized track practice and the manufacture of much of the roadway and track material at the Shakako works, where all of the structural and bridge work has been taken care of for some time. Much of the existing track material has come from American sources, and the track construction, in general, is practically along American lines. As on the Japanese and Korean railways, considerable trouble has been experienced in some places with floods damaging the roadway,

but much of this danger, particularly on the Antung line, has been overcome by judicious grading changes in raising the track at such points.

LOCOMOTIVES.

The number of locomotives averages 0.4 per mile of line. Of the 270 locomotives, a large number are of American manufacture. Some of the largest and most recent were built in the Shakako works; most of these were 2-8-0 freight locomotives with 163,000 pounds on 54-inch drivers, weight of engine and tender complete about 292,500 pounds, 180-pound boiler pressure, and superheated.

At present the South Manchuria Railway has 24 locomotives on order in America, but it is probable that the greater number of these are intended for the Korean section, which is not so well equipped with motive power as the main lines. There were also in course of erection, when the writer visited the works, 9 locomotives, which were largely intended for the Korean lines. In addition, 4 locomotives were in course of erection for the Ssuningkai-Chengchiatun line.

The present electric locomotive equipment for the Fushun tramways was erected at these works. Several additional electric locomotives were in course of construction in 1917. Most of the equipment had come from American sources, but three small locomotives had equipment that came from Germany before the beginning of the war.

One rather interesting feature regarding the 2-foot 6-inch gauge rolling stock of the original Mukden-Antung line, which consisted of 217 locomotives, 157 passenger cars, and 3,727 goods wagons, has been their use for the light railways in Chosen and also, to a certain extent, in Japan. This supply is now exhausted, however, and additional equipment will have to be obtained by purchase from other sources.

PASSENGER CARS.

These lines have about 0.3 passenger car per mile of line, which, considering the amount of business handled, is below normal. This equipment, however, is well adapted for handling the traffic. Most of the equipment is of American manufacture and is all along the lines of American standard practice. In the last three or four years, however, a considerable amount has been built at the Shakako works, including two steel under-frame dining cars, three combination coaches and dining cars, and six sleeping cars; and when the writer visited the works in July, 1917, additional equipment was in course of construction, including 10 passenger cars and 60 freight cars for the Ssuningkai-Chengchiatun line.

The steel-frame dining cars are probably the most substantial equipment that has been built in the Far East. The under frame is entirely of steel, robustly constructed and designed to take all the draft strain through the center longitudinal girder. The trucks are of six-wheel Pullman type; the couplers are Buhoup automatic three-stem; quick-action automatic air brakes with 18 by 12 inch cylinders are used; the cars are electrically lighted and steam heated from the engine; the wheels are 36 inches in diameter and are steel tired with mild steel plate centers; and the journals are 5 by 9 inches. The general dimensions are as follows: Length between coupler knuckle faces, 80 feet 3 inches; height of coupler center, 2 feet 11 inches; height

of the floor top from rail, 4 feet 5½ inches; extreme height from rail, 15 feet 1½ inches; extreme width, 10 feet 4½ inches; car body, outside length, 72 feet 7½ inches; outside width, 10 feet 1½ inches; truck wheel base, 10 feet 6 inches; total wheel base, 67 feet. The tare weight of these cars is 122,000 pounds.

FREIGHT CARS.

The freight equipment of all classes averages 4.7 cars per mile of line; this figure, with the amount of business handled, indicates that the equipment is being worked to full capacity. There are 5 refrigerator cars, 18 oil-carrying tank cars, 119 caboose cars, 215 100,000-pound-capacity coal cars, and the remainder of the equipment consists of 60,000-pound-capacity covered and open cars, a considerable number of which are gondola cars for handling coal. All this rolling stock is equipped with automatic couplers and air brakes. The wheels are all 33 inches, chilled cast iron; they are now being produced at the Shakako works, which are also producing steel cast centers as required. All freight cars are equipped with four-wheel trucks. A very large part of this freight equipment is of American manufacture, but the Shakako works are turning out an increasing amount each year and are reducing the percentage of parts and materials required from the outside.

WORKING EQUIPMENT.

These lines have a small amount of working equipment, most of which is now in use at the Fushun mine, where there are now in service nine steam shovels and one drag-line dredge, as well as a considerable number of Western side-dump cars. There is very little wrecking and similar equipment on the other parts of the line. The harbor department has a small amount of dredging equipment and barges—used entirely in the construction and maintenance of the harbors at Dairen and Port Arthur.

WORKSHOPS.

Special attention has been given to the matter of workshops on these lines. In addition to the Shakako works, near Dairen, which have already been referred to repeatedly, there are additional district shop facilities near the Dairen wharves and at Liaoyang, Kungchuling, and Antung. There are also equipment-handling facilities, or what are termed "running sheds," at Changchun, Penchihiu, and several other points, in addition to considerable shop equipment at Fushun for taking care of both the coal-carrying railway equipment and the so-called tramway equipment (particularly electric locomotives) for the switching work around the mines. All of these shop facilities except the Shakako works are for taking care of the running situation and are arranged only for the making of current repairs.

The Shakako works are, however, the most important in the Far East to-day from the standpoint of the manufacture of railway equipment. The shops of the South Manchuria Railway were originally located in Dairen, but these quickly became inadequate and the present site, comprising about 400 acres of well-adapted land about

4 miles from Dairen, in close proximity to the main line, was selected and the Dairen tramways were extended to the main entrance.

The general arrangement is a model in many respects. Some parts, particularly the locomotive shops, conform closely to the Philadelphia & Reading shops at Reading, Pa., the plans of which were followed in general. The plant consists of a very complete and well-equipped machine shop, engine-erecting shop with one 100-ton and two 30-ton overhead cranes, smith and forge shops, iron, steel, and brass foundries, complete sawmill and woodworking shops, passenger-car shops, including a well-designed paint shop, and freight-car shops, with all the necessary facilities in the way of electrical shops, general stores, power house and lighting plant, and the shops' own system of waterworks, including fire protection. In brief, the shops constitute a very complete general manufacturing plant for the production of all kinds of railway equipment and materials, including roadway and track materials, especially bridge work and fabricated structural materials. During the last three years the works have designed and built three meter-gauge locomotives for the French Indo-China railways. They have also built some large lathes, more than 50 of which have gone to the Russian Government and a number of which have been sold to concerns in the Osaka industrial district of Japan. They have handled all the heavy castings and fabricated all the requirements for the new 150-ton blast furnace at Penchihi and are furnishing all the materials for the two 250-ton blast furnaces and steel plant now under construction at Anshan. When the writer visited the works in July, 1917, there was in course of construction a large amount of fabricated and distilling equipment for a new oil refinery being built in the northern part of the main island of Japan.

In July, 1917, there were about 4,150 employees of all classes, of whom 71 or 72 per cent were Chinese—all employed in the wage occupations. All salaried, administrative, and technical positions are occupied by Japanese, as is also the case with all supervising positions, such as those of foremen, gang bosses, and similar employees who have to do with keeping the men busy and on the move. The writer was particularly impressed with the fact that the men in all departments were busily engaged. A visit to these works affords very convincing proof of the capacity of the robust northern Chinese to make good workmen in such shops, especially in molding of all kinds, in fabricating and erecting work, and as machine-tool men. One interesting feature in the engineering office was the large percentage of Japanese girls employed in making tracings and doing some of the less difficult drawing.

General sanitary conditions in these works are excellent, and, in addition, there is near by a model town which was first arranged to take care of Japanese employees, but to which additions have been made to take care of a portion of the Chinese, particularly those with families. There are now nearly 1,000 dwellings in this colony (small but substantial and comfortable); water is supplied from the shops waterworks; gas is furnished from Dairen; and many of the better houses are electrically lighted. There has grown up also a considerable population immediately outside the limits of the model village; the latter has been extended to take care of some of this growth, and probably will be extended further in the future. Altogether, this model town is a most unusual feature of this part of the

world; but, like similar towns in other parts of the world, it has obviously proved its value to the company as well as its benefit to the employees.

The directory of the principal officials of the South Manchurian Railway, including the Korean section, is shown in order on page 270.

PURCHASES.

Both the South Manchuria Railway and the Korean Railways, as already stated several times, have purchased much of their equipment, materials, and supplies from American sources. A considerable part of this business has been handled directly through American concerns. Many of the requirements in the future, particularly in the way of special parts and materials, will no doubt be supplied from the United States, but much of the business will probably be conducted through the strong Japanese commercial and engineering concerns with well-staffed branches at Dairen, such as the Mitsui Bussan Kaisha, Takata & Co., and Okura & Co., all of which have strong American connections. There is no doubt that this practice is steadily growing both in Manchuria and Korea, as well as in Japan proper. There is also, however, a great tendency for these concerns to represent Japanese manufacturers who are in a position to make delivery. The latter will doubtless be given preference in awarding the business, when other things are equal, even though the prices for the Japanese products may be higher than for those from other sources. One particular part of the business that will probably be of considerable volume, if followed up, will be the furnishing of the special parts and materials for the equipment to be manufactured and erected at the Shakako works.

Purchases are negotiated principally by the stores department at Dairen, although it is stated that the Korean section will continue to make purchases of articles that can be obtained locally along the line and from the concerns with branches in Seoul. In some instances purchases are handled through the Tokyo office, but this is only in special cases when the business can be conducted to better advantage with concerns in Tokyo that may not have special representatives in Dairen or Seoul.

KIRIN-CHANGCHUN RAILWAY.

LOCATION AND EXTENT.

The Kirin-Changchun Railway, while nominally a Chinese Government railway, is now actually under the control of Japanese interests, through the management of the South Manchuria Railway Administration. For this reason it was shown under a subheading in the Chinese Government Railways tabulation, was not included in the several statistical tables of these railways, and is now shown as one of the railways in the area of the Japanese "sphere of influence" in Manchuria. These same remarks apply to the Ssuningkai-Cheng-chiatun Railway, immediately following.

Connection is made with the South Manchuria Railway at Changchun, where the latter company's central passenger station is used; this station is also used by the Harbin-Changchun branch of the Chinese Eastern Railway. The present line extends in a general easterly direction about 80 miles to Kirin, the capital of the Man-

churian Province of Kirin. The terminus at Kirin includes an extension to the banks of the Sungari River, where freight connection is made with the river traffic.

HISTORICAL SURVEY.

Although lines had previously been suggested to Kirin, particularly one extension of the Peking-Mukden Railway, this particular line was first proposed in 1900. Work was not started, however, until the fall of 1909. The line was finally opened for general traffic in October, 1912, but this was done with some temporary construction, one part of which is not yet completed.

CONSTRUCTION COST AND INVESTMENT ASSETS.

Mr. G. A. Kyle, in his study of the construction cost of the Chinese Government Railways, shows the cost of this line as \$78,261 Mex. per mile of line. This, however, does not represent the final cost, on account of the expense still to be incurred in building about 4 miles of line on the final location, including a tunnel 3,000 or 4,000 feet in length. The consolidated report for the Chinese Government Railways for 1915 showed the total cost of road and equipment carried to the balance sheet as \$6,193,595 Mex., but this has been increased somewhat since that date on account of the completion of a small amount of the construction and the purchase of nine locomotives from America.

FUNDS AND CONTROL.

The present line was built partly with funds from a 2,150,000 yen (\$1,071,775 gold) loan from the Yokohama Specie Bank (Japanese), and the remainder of the funds was furnished by the Chinese Government from other sources. In the latter part of 1917 a further loan was negotiated by the Chinese Government with the Yokohama Specie Bank, the total amount being 6,500,000 yen (\$3,240,250 gold); this includes the former loan of 2,150,000 yen. This loan is for a term of 30 years, was issued at 91.5, and the rate of interest is 5 per cent per annum. The property and revenues of this railway are security for the loan, although it was never stated that the loan was made for further development of this line. In the announcement of this loan the following statements were made:

During the term of the loan the South Manchuria Railway Co. shall be intrusted with the management of the Chinese Railway and shall receive 2 per cent of the net profit as expenses. * * *

The Chinese Government shall appoint a director to supervise all affairs of the railway. The South Manchuria Railway Co. shall appoint chiefs for the engineering, transportation, and accounts departments, one of whom shall represent the Japanese bankers and shall have full power to act in accordance with the stipulations. But if there is any important affair to be considered, the representative of the Japanese bankers will have to consult the Chinese director beforehand.

Therefore, although this is nominally a Chinese Government line under the direction of the Ministry of Communications, with a Chinese managing director in general charge, it will in fact become a feeder to the South Manchuria Railway, being to all intents and purposes under Japanese control. By this arrangement the road will no doubt be efficiently managed and the property improved and developed.

EXTENSIONS SUGGESTED.

Various plans and suggestions have been made for extensions of the Kirin-Changchun Railway, and without doubt one of the objects of the loan just mentioned was to prepare the way for the utilization of this line as part of a system of lines, one of which will be the Kirin-Hweining Railway, discussed on page 208. Another line likely to be built may follow the Sungari River for a short distance and then turn to the northeast; it will probably be extended to the headwaters of the Hurka River and follow this to Lake Birten or Ninguta, in which neighborhood a turn to the southeast would be made, with the line running to the Tumen River in northeastern Chosen and then to the port of Seishin or Keiko. From Ninguta a line would probably be built to connect with the Chinese Eastern at Harbin. These new lines would total several hundred miles of railway—much of it through rather rough terrain and a considerable portion through well-timbered country, the products of which will be much in demand in this part of the world in the next few years.

TRAFFIC.

The business of this line at present is about 40 per cent passenger and 60 per cent freight, and, with the development of the country and further extensions, no doubt the freight traffic will increase at a greater rate than the passenger business. Agricultural products constitute about 60 per cent of the present freight traffic, lumber 20 per cent, manufactured products 15 per cent, and mineral products 5 per cent, animal products being negligible.

EARNINGS AND EXPENSES.

The gross earnings for 1916 were \$933,444 Mex. and the operating expenses \$756,379 Mex., making an operating ratio of 81 per cent. It is doubtful, however, whether the figure given represents sufficient expenditure to fully maintain both roadway and rolling stock.

INCOME CHARGES AND LOSS.

After payment of interest charges on funded debt and all other income charges there was a deficit of about \$50,000 Mex. Although it is possible that the results from this property will be improved under the virtual management of the South Manchuria Railway Administration, it is hardly likely that it will show a profit.

ROADWAY AND TRACK.

The line lies through a rolling country where railway construction is not particularly difficult, although a good deal of bridging was required. The line is fairly well located and constructed mostly with permanent structures. The track at present is laid with 60-pound rail, which came from the Han-Yeh-Ping Steel Works, but it is stated that as soon as prices become normal it is to be laid with 85-pound rail of the same weight and section as much of the South Manchuria line. The line is tied fairly well and ballasted largely with broken stone. The track work conforms, in general, to that on the Chinese Government Railways (particularly the Peking-Suiyuan), especially the frogs, switches, and similar materials. The bridges seem some-

what light for carrying heavy motive power. It was stated that these were for loading between Cooper E-35 and E-40. Most of these bridges were fabricated at the Shanhaikwan Bridge Works of the Peking-Mukden Railway.

ROLLING STOCK.

The rolling stock consists of 22 locomotives, 25 passenger cars, and 227 freight cars, with no service cars. All of this equipment, except 9 locomotives, was furnished from the Tangshan shops of the Peking-Mukden Railway. The 9 locomotives were furnished from the United States early in 1916. This rolling stock is all equipped with Janney-Penn automatic couplers. Passenger cars are all equipped with air brakes, and the freight equipment averages 46,500 pounds carrying capacity per car. The locomotives, including the 9 new ones, are somewhat light for handling the traffic economically—particularly over the steep grades of the temporary line at the point that is to be reconstructed, which is near the middle of the line and governs the trainload in both directions.

WORKSHOPS.

There are small shops at Changchun. These, however, are not intended for the manufacture of equipment, but only for the making of miscellaneous and general repairs. With the new management it is very likely that the furnishing of equipment, and also probably the handling of heavy repairs, will be taken care of in the shops of the South Manchuria Railway.

OFFICIALS—PURCHASES.

A directory is given in order on page 272, but this does not include the chief of the traffic department called for by the new agreement, since this appointment had not been made when the writer visited Changchun.

Purchases were formerly largely directed by the Japanese chief engineer through the Chinese managing director, but it is probable that the arrangement in the future will be for the chief engineer to handle this business largely through the purchasing department of the South Manchuria Railway, including the drawing on the general storeroom at Dairen and the Shakako workshops.

SIGNING OF CONTRACT FOR KIRIN-HWEINING RAILWAY.

The most important railway development in the Far East since the merger of the Korean Railways with the South Manchuria Railway on August 1, 1917, was the signing, on June 18, 1918, by the Chinese Minister of Communications and representatives of a Japanese banking syndicate, of the preliminary contract for the construction of the Kirin-Hweining (or Kirin-Kwaimei) line. This new railway will traverse eastern Manchuria (Province of Kirin) to the Korean border, where it will connect with the Kwaimei-Seishin Railway to the Sea of Japan, giving the South Manchuria Railway a new deep-water outlet and opening a new and rich territory to commercial and industrial exploitation. It will also, through its connection at Kirin city with the Kirin-Changchun line, which in turn connects at Chang-

chun with the Chinese Eastern, provide the Trans-Siberian route with an ice-free terminus at Seishin as an alternative to Vladivostok.

The preliminary contract provided for an immediate advance of 10,000,000 yen at 7½ per cent by the Japanese syndicate, which is composed of the Bank of Taiwan, the Bank of Chosen, and the Industrial Bank of Japan, in exchange for Chinese treasury notes for six months, at the end of which period the formal contract was to be signed. The Japanese banks were pledged, on the signing of the formal agreement, to float for the Chinese Government 40-year 5 per cent bonds for an amount sufficient to refund the 10,000,000 yen advance and to complete the construction of the railway.

The preliminary contract did not indicate the method of operation of the new line, but it is assumed that it will be on a basis similar to that of the Kirin-Changchun line, which belongs to the Chinese Government, but is operated under Japanese supervision, by the terms of a loan of 6,500,000 yen, in a way to make it essentially a part of the South Manchuria Railway.

The route of the railway from Kirin to Hweining (Kwaimei) will follow the old caravan road from Kirin southeastward over the Haerpha Mountains, through the so-called West Yenki district of Kirin Province, to Lungchingsun and thence through Huolikow Pass to the Tumen River, the boundary between Kirin and Chosen (Korea). Over this river, which is a wide, shallow stream, navigable only by rafts and very small boats, an international bridge will be built, the Chinese Government and the government general of Chosen each paying half the cost. Trains will run from this point over the Kwaimei-Seishin Railway (Kwaimei being the Japanese name for Hweining) to the sea.

Seishin as a port dates only from the Russo-Japanese war. Before that time it was a Korean village of about 200 inhabitants. It was opened to trade in 1908 and a Japanese town sprang up, which increased rapidly in size and importance after the building of the light railway and still more rapidly after the standardization of the railway in 1917. In the decennial report of the Chinese Maritime Customs for the northern ports, 1902-1911, this statement is made: "It is predicted by some that when the Kirin Railway is extended to Kwaimei and connected up with Seishin, the latter place will become a great exporting port—in fact, the shipping point for the surplus products of all eastern Manchuria; in other words, it will rival Vladivostok and take away a large part of its present trade." The commissioner of customs at Lungchingsun remarks, however, that he thinks that Seishin will never outstrip Vladivostok. The harbor at Seishin is not exceptionally good, though it is one of the best on the northern Korean coast and is usually ice-free. It is wide and deep but too open. Two breakwaters have been built, inclosing an area of 10 acres, which has been sufficient for the needs of the port thus far. Undoubtedly the breakwater system will now be extended by the government general of Chosen.

The distance over which the Kirin-Hweining (or Kirin-Kwaimei) Railway will run is approximately 410 miles—320 miles from Kirin to Lungchingsun, 20 miles from Lungchingsun to Huolikow Pass, and 70 miles from the pass to the end of the line. Though the road

is to cross three rivers and two mountain ranges, the engineering difficulties are said not to be great.

[The foregoing account of the Kirin-Hweining Railway is from a report submitted by Trade Commissioner A. W. Ferrin, when he was acting as commercial attaché at Peking.]

SSUPINGKAI-CHENGCHIATUN RAILWAY.

LOCATION AND EXTENSIONS.

This line connects with the South Manchuria Railway at Ssupingkai and runs in a northwesterly direction, toward Inner Mongolia, a distance of about 52 miles to the important city and trade center of Chengchiatun. A further extension of about 150 miles to this line has already been considered, and as soon as materials can be obtained this no doubt will be made by the same interest that built the present line. These extensions will reach the upper valleys of the Liao River in Inner Mongolia claimed as part of the Japanese "sphere of influence." This country is rich in both agricultural and pastoral products, and it is also stated that there are valuable fuel and other mineral deposits to be reached by extensions of this line.

HISTORICAL SURVEY.

The history of this line is very brief and recent. It may be regarded as one of the important results of the agreement between Japan and Russia as to the areas of the "sphere of influence" that was allocated to Japan in Southern Manchuria and Eastern Inner Mongolia. This, no doubt, is also a counteracting line against the Chinchow-Aigun line projected between Chinchow on the Peking-Mukden Railway and Aigun on the Amur River. An effort was made at one time by American capital to secure the concession for building this last line.

The loan agreement for the financing, construction, and operation of this line is with the Yokohama Specie Bank (Japanese) and is dated December 29, 1915, as shown by Appendix No. 9 of this report. The first location surveys were made in July, 1916, work was started early in 1917, and the line was opened for traffic in November, 1917. This, however, was with considerable temporary construction, particularly bridges, which will have to be rebuilt, as mentioned later.

FUNDS AND CONTROL.

The funds for the construction were furnished by the 5,000,000 yen (\$2,492,500 gold) loan previously mentioned. The term of the loan is 40 years, the rate of interest 5 per cent per annum, amortization to begin the eleventh year and to be effected by semiannual payments; but the loan can be redeemed in part or in whole by payment of 2½ per cent premium until the end of the twentieth year and then can be redeemed at par. The issue was made at 94.5, and the railway property and revenues are pledged as security for the loan, which is also guaranteed by the Chinese Government, as to both principal and interest. This is one of the cases in which a railway was built to develop a claimed "sphere of influence," largely if not wholly to meet the desire of interests other than Chinese; but, notwithstanding this, the Chinese Government guarantees the loan.

While the agreement calls for a Chinese managing director, it requires both the chief engineer and the chief accountant to be Japanese, and, in addition, during construction, most of the administrative and technical staff were Japanese. The Japanese chief engineer and chief accountant, being permanent employees, will no doubt be in virtual charge of the property, particularly as the operating agreement has been made with the South Manchuria Railway for the hire of rolling stock and the exchange of traffic, including the use of the latter company's station facilities at Ssupingkai.

CONSTRUCTION COST AND CAPITAL LIABILITIES.

The construction cost was estimated, on account of the high cost of materials, at \$120,000 (Mex.) per mile, and thus a total of about \$6,000,000 (Mex.) would represent the cost for the present line. It is generally understood that, with the present price of silver, the 5,000,000 gold yen will not be sufficient to complete the construction, and it is also stated that thus far only 3,500,000 yen of the loan has actually been issued, although there is little doubt that the remainder will be made available to complete the line as far as possible.

The amount of the loan issued constitutes the capital liability to date.

ROADWAY AND TRACK.

The present line is through a rich agricultural country where railway construction is comparatively easy, except for the considerable amount of bridging required, which will be expensive for permanent structures on account of the extreme difficulty of foundation. This is particularly true of a bridge of more than 2,100 feet across the Liao River, where a temporary structure has been built; but on account of the floods occurring in this river during the rainy season permanent structures will be built as soon as possible. The investigations of the foundations for this last bridge indicate that the substructure work will be extremely difficult and expensive. All the other bridges are now temporary structures, and it is planned to rebuild them as permanent structures in the course of time. There is no stone or timber along any part of the present line, and both have had to be shipped in by the South Manchuria Railway; this includes broken stone for ballast. The track is laid with 85-pound rail, which, with the fastenings, came from the Han-Yeh-Ping Steel Works. The South Manchuria 8-foot-6-inch standard ties were used, and the track materials and work are very similar to the practices on the latter line; in fact, much of the material was actually received from the South Manchuria stores department.

ROLLING STOCK.

So far all the rolling stock used has been leased from the South Manchuria Railway. There are on order in the Shakako works 4 locomotives, 10 passenger cars, and 60 freight cars, all along the standard lines of construction of the South Manchuria line, but the delivery of these has been delayed on account of special parts and materials required but not delivered. It is very likely, however, that part of this equipment will have been delivered by the time this report is in print.

WORKSHOPS.

Running sheds and small workshops are being provided at Ssu-ping-kai. These are apparently intended only for the making of current and general repairs, and are not intended for the manufacture of equipment. It is more than likely that many of the shop requirements of this line will be taken care of at the Shakako works of the South Manchuria Railway.

TRAFFIC AND EARNINGS.

The traffic of the present line will largely consist of agricultural products obtained along the line and both agricultural and pastoral products from Chengchiatun. It is reported that the earnings of the line for the first few weeks averaged about 2,750 yen (\$1,370 gold) a week, which is somewhat better than the showing of the Mukden-Antung branch of the South Manchuria Railway when first opened for traffic. From all appearances one seems warranted in predicting that this line will do a considerable volume of business, and particularly that it will make a valuable traffic feeder to the South Manchuria Railway.

OFFICIALS—PURCHASES.

Mr. Yu Yu (Chinese), formerly managing director of the Kirin-Changchun Railway, is now the managing director of this line and Mr. J. Fujine (Japanese) is chief engineer.

Purchases for this line were made largely by the chief engineer (Japanese) subject to approval by the managing director (Chinese). The rail fastenings came from the Han-Yeh-Ping steel plant, and the structural materials will be furnished from the Shakako works, as will also be the case with the rolling stock requirements. It is entirely probable that in the future requirements will be arranged for largely through the South Manchuria Railway purchasing department at Dairen, drawing on this company's Dairen storeroom and the Shakako workshops.

III. RUSSIAN RAILWAYS IN MANCHURIA AND EASTERN SIBERIA.

INTRODUCTION.

While the heading of this section of the report is "Manchuria," it seems desirable to explain the general situation as regards the Russian railways in eastern Siberia. The Chinese Eastern Railway, Southern Ussuri Railway, Amur Railway, Pin-Hei Railway, and Amur River steamer lines are in a way under one general administration, and the Chinese Eastern and the Southern Ussuri are managed as one system.

This is a very interesting situation, about which much could be written, but, until some settlement of the present chaotic conditions is effected, such a discussion would have very little point in relation to markets for railway equipment and materials. The writer visited Changchun, Harbin, Nikolsk, and Vladivostok in August, 1917, but was unable to obtain information directly from the railway officials on account of the large number of changes that had already occurred and the disturbed conditions prevailing even at that time. Therefore, the following account will refer very briefly to the situation and give an idea of the general arrangement.

The lines in which we are interested are the Chinese Eastern Railway—the part of the Trans-Siberian line in Manchuria—and the Southern Ussuri Railway—the part of the Trans-Siberian line from the eastern Manchurian border to Vladivostok. The other lines are mentioned for the reason that this can be done much more briefly when they are combined than when they are referred to separately.

The Chinese Eastern Railway includes all that part of the Russian Trans-Siberian route that lies in Manchuria. It consists of the main line running west from Pogradichnaya (Suifeng, Chinese name) on the Ussuri border to Manchuria (Manchouli) on the Trans-Baikal border, a length of about 926 miles, and a branch south from Harbin to Kwanchengtze (a point about 2 miles north of Changchun), from which place the South Manchuria Railway owns the tracks giving entrance to the central station used by all railways entering Changchun.

The Southern Ussuri Railway starts at the port of Vladivostok and runs north a distance of about 68 miles to Nikolsk. Shortly after passing this place, a turn is made and the line runs west to Pogradichnaya, a distance of about 143 miles from Vladivostok. In addition, what may be called a section of the Amur route continues north from Nikolsk, following the Ussuri River to its junction with the Amur River at Khabarovsk, or, as it is frequently called, Habarovsk. This line between Vladivostok and Khabarovsk was the first part built of the eastern end of the Trans-Siberian route, work being officially started in May, 1891, at Vladivostok.

It is not generally known that the Amur Railway—running parallel to, and 15 to 50 miles from, the north side of the Amur River from

Khabarovsk to a point just east of Chita, a place about 300 miles farther west than Manchuria station and about 650 miles east of Irkutsk—is connected and that trains are being run by this route. While this line is connected, it is not ballasted or in serviceable condition for reliably handling regular traffic.

The bridge across the Amur River at Khabarovsk is approximately 7,600 feet in length, was opened in November, 1916, required five years to build, and cost about 18,000,000 rubles, or approximately \$9,000,000 gold. The construction of this bridge was contracted for in Austria, but, as most of the material was on the ground at the opening of the war, it was finished by the Russian engineers.

There is one branch from the main line to the important city of Blagovestchensk, on the Amur River nearly opposite Aigun and Taiheho, the northern terminus of the proposed Chinchow-Aigun Railway.

During the navigation season of about six months, the Amur River steamer lines form a very important feature of the transportation situation in this part of the world. These steamer lines cover not only the Amur River but its navigable tributaries, of which there is a very considerable number, the Sungari being the most important. Much of this transportation is done by native Chinese craft, but in the last 25 years there has grown up a fleet of Russian river steamers and trailer barges. The Chinese Eastern Railway owns 13 of these steamers and 30 barges. In the operation of this river traffic one steamer at times tows as many as five good-sized barges. In recent years most of these steamers and barges have been operated as a combination, under the direction of Messrs. Oparim and Alexieff, two well-known merchants of Harbin. This combination included the leasing of some of the Chinese Eastern floating equipment above mentioned. It is access to this system of navigable rivers that is desired by the Japanese in acquiring the additional 75 miles of the Harbin-Changchun branch, so as to reach the first crossing on the upper part of the Sungari River, where it is still navigable by these river steamers.

As regards the projected Pin-Hei Railway, it may be noted that a preliminary agreement was made between Russia and China in 1915 and 1916 for building a line from Harbin to Mergen and then on to Aigun and Taiheho on the Amur River, with a branch from the Chinese Eastern Railway at Angangki through Tsitsihar to Mergen, to connect there with the other line. This railway, according to the agreement, was to be built by Russia as a Chinese Government railway and to be guaranteed by the Chinese Government, but it would be entirely for the benefit of Russia, particularly from a strategic standpoint. The line would be through a rather rough country but one rich in both agricultural and pastoral products. Apparently little or nothing is known about the mineral resources along this line.

THE PORT OF VLADIVOSTOK.

Vladivostok is a very excellent port with deep water in the harbor, and with the ice breakers now used it is actually kept open for navigation all the year round. This result is greatly assisted by the favorable winds during the winter, which blow in a direction tending

to drive the broken ice to sea. There are large warehouses along a large part of the water front, all of which are served directly by railway tracks. These facilities are, however, more for the handling of inbound materials and manufactured products than for outbound shipments. During normal times soya beans, bean oil, and bean cake constitute one of the largest items of export. The beans are handled in sacks in a way quite similar to the methods of handling wheat in Australia.

CONDITIONS AT HARBIN.

Harbin is the administration headquarters for the Chinese Eastern and the Southern Ussuri Railways. The town is divided into two distinct parts. The railway and civil administration is in a part of the town lying on the high ground, but on account of the port facilities and for other reasons a large part of the civil population lives in what might be called the lower town. Harbin is, without doubt, the most important commercial center in all of central and northern Manchuria, and it is the principal port for the fleet of river steamers above mentioned. The tracks of the Chinese Eastern Railway extend for a considerable distance along the river front, where transfer is made directly from railway cars to the river steamers and barges, and from this point shipments are made to all the places reached by this system of navigable rivers. It would undoubtedly be of great benefit to the development of all this region if the Harbin-Changchun branch of the Chinese Eastern Railway were changed to 4-foot 8½-inch gauge, thus enabling shipment to be made directly from China and Southern Manchuria to these river wharves. This is one of the reasons why the Japanese have made such persistent efforts to secure control of this branch.

FINANCES, MANAGEMENT, AND EQUIPMENT OF LINES.

So many writers have already fully covered this situation that it seems unnecessary to include any historical statement in this report other than what has already been said and what is given in Appendix 2.

CONSTRUCTION COST AND CAPITAL LIABILITIES.

The Far Eastern Review, in its railway number of November, 1909, shows the cost of the Chinese Eastern Railway as \$90,000,000 gold. This has been added to somewhat—chiefly on account of reconstruction, though it is very probable that some of the additional amount was spent on other than strictly railway expenditures. There seems to be a variety of opinion as to the actual construction cost of this line, but if it is not in excess of the above figures it is not so unduly expensive as is usually stated, particularly when all the conditions are considered. No accurate information was obtained concerning the present capital obligations of these lines.

TRAFFIC.

The traffic on the Chinese Eastern Railway totaled about 2,121,500 tons for the year 1915, of which grain was the largest item, constituting about 45 per cent. Coal was next, constituting about 8 per cent, and tea was next, amounting to almost 5 per cent. There

was a large increase of tonnage handled as compared with the previous year, grain and coal each increasing about 50 per cent and tea about 100 per cent.

ORGANIZATION AND OPERATING METHODS.

The organization is of the typically bureaucratic type in all features. Methods of operation and train running conform to the station-master method in all its purity. There are buffet stations, averaging about 25 miles apart, where ample time is allowed for refreshment. One memorable feature of Russian train operation, particularly in yard switching, is the constant use of a large resonant whistle to sound a code of signals to switchmen who are located on the ground to throw switches for the handling of cars. In the yard at Harbin a surprisingly large number of men are used as ground switchmen.

While the writer made inquiry as to the performance figures of these lines, it was impossible to obtain data that would satisfactorily show the facts and represent the normal conditions.

ROADWAY AND TRACK.

The line passes through a great variety of country; therefore the location and construction are all the way from "easy" to "difficult and expensive." As a whole, the line appears to be reasonably well located and the construction substantial, although the Southern Ussuri line shows to some advantage over the Chinese Eastern, particularly in the use of stone ballast on the former as against indifferent gravel ballast on the latter. The structures are all permanent and some of the bridges are imposing, especially the five-span bridge over the Sungari River at Harbin. The tunnels, of which there is a considerable number, are well constructed, particularly the substantial lining in most of them.

All these lines are of the Russian standard 5-foot gauge. There is a great variety of materials—some rather unusual—used in the track work, and the writer was impressed with the fact that those in charge seemed able to use any kind of a track device that they were able to obtain.

ROLLING STOCK.

The rolling stock is even more varied than the track devices. The recent equipment received from the United States seems to be used without any apparent difficulties, with the other mixed equipment, but most of this new American equipment was loaded at Vladivostok and sent to Russia, and it usually never came back. Therefore, most of this equipment that the writer saw was in transit on its way to Russia. Most of the rolling stock in use for local service was of continental types and much of it was manufactured in the Russian shops. The locomotives, as a rule, were small, and many of them had an adjustable diamond stack for the burning of coal or wood.

WORKSHOPS.

Large workshops are located at Harbin. These are capable of handling all classes of repairs to rolling stock, as well as a good deal of manufacturing, if the latter is desired. Since the beginning of the war, a car erecting or assembling shop has been used at Vladivostok for handling the cars received from the United States. This latter was one of the results of the Stephens Railway Mission to Russia. Formerly all the engines received were loaded on cars and hauled 486 miles to Harbin, where they were assembled.

OFFICIALS—PURCHASES.

While the writer obtained a list of the principal officials in charge in August, 1917, there have been so many changes since that time that no attempt will be made to give a directory of the officials of these lines. A similar condition prevails with respect to the handling of purchases, although one feature has developed during the period since the beginning of the war. Formerly purchases were handled largely through headquarters at Petrograd, but there was a constantly growing practice of buying directly from concerns in Harbin, if the needed articles could be so secured. A number of American concerns have branches in Harbin, and most of the large Japanese concerns, with branches at Dairen, also have branches in Harbin.

IV. MANCHURIAN AND VLADIVOSTOK TRAMWAYS.

DAIREN AND FUSHUN TRAMWAYS.

As already explained, both the Dairen and the Fushun tramway systems are owned and operated by the South Manchuria Railway Co. The mileage and equipment are shown by the table on page 195. Both these systems are well constructed, maintained, and operated, and the greater part of the equipment, particularly electrical, is of American manufacture.

In addition to the passenger service, the Dairen lines have 10 motored freight cars used for distributing freight from and to the steam railways and wharves for the industries in Dairen—particularly soya beans to the oil mills and oil and bean cake from these mills. This service is performed very expeditiously and satisfactorily and prevents a great deal of heavy trucking over the paved streets. All of the Dairen tramway equipment is 600 volts direct current, and a very simple pantagraph contact is used, which, in turn, greatly simplified the overhead construction. There is a very interesting system of fares on the Dairen line, based on time limits. First-class fares are 5 sen (2½ cents gold) for a half-hour ticket and 6 sen (3 cents gold) for a one-hour ticket.

The tramways at Fushun are primarily for the handling of coal, and the passenger service is a secondary consideration.

MUKDEN HORSE TRAMWAYS.

The Mukden horse tramway starts at the railway station in the railway area and runs a distance of a little more than 4 miles, to the west gate of the west wall of the inner city. This distance is divided into three zones, the fares for the two outside zones being 3 sen (1½ cents gold) and the fare on the zone in the outer city being 4 sen. The rail on this line is a very light section of T rail, and both this rail and the cars were formerly in use on the Tokyo horse tramways; the cars were first used on horse tramways in New York City before the days of electric street railways.

This concern is Sino-Japanese—the Japanese interest largely represented by the cars and materials furnished from Tokyo. There is very little real capital invested in the plant, and it is understood that the concern is not unduly prosperous. The service is not well patronized, as it is neither expeditious nor attractive.

VLADIVOSTOK TRAMWAYS.

The electric tramways in Vladivostok at present total about 4 miles of route, and about 3½ miles additional are under construction. The present lines were under private ownership when the writer was in Vladivostok, but the new lines are being built by the city and the general opinion prevailed that the system would later be taken over

by the city. The manager and engineer in August, 1917, was H. C. Schriber, and the principal owners were A. K. Gromadsky and H. A. Zimmerman. Current is supplied from the city power plant. All the equipment is largely from German and Russian sources. Financially the concern was in very doubtful condition, and much trouble was being experienced with the employees in the operation of the lines.

TSITSIHAR (ANGANGKI) LIGHT RAILWAY.

The Tsitsihar Light Railway connects the Chinese city of Tsitsihar, capital of Heilungkiang, the most northerly Province of Manchuria, with New Tsitsihar, a new town on the Chinese Eastern Railway, about 18 miles distant in a southerly direction.

The Russians, in building the Chinese Eastern Railway, kept the line at this distance with the idea of the advantage that would accrue to them in the building of a new town inside the limits of the railway zone over which they claimed jurisdiction.

The line was built entirely with provincial funds and has always been controlled and operated by the provincial authorities. The construction was begun in September, 1907, and surveys were established two years later. It is stated that the capital expenditures have exceeded 240,000 taels. The track is of meter gauge.

This light railway has at times been brought into prominence by the Chinchow-Aigun project, which is one of the concessions that has been negotiated for by American interests in competition with Japanese and Russian interests. The last phase was the signing of a preliminary agreement with a Russian concern for the construction of a line from Harbin to Aigun on the Amur River, and also a line from Tsitsihar that would connect with the above line at Mergur, which point is about half way from Harbin to Aigun.

The contract for the construction of this line was given to Telge & Schroeter, of Tientsin, who purchased all the roadway and track materials and rolling stock from Orenstein & Koppel, of Berlin. Mr. W. R. T. Tuckey, formerly of the Peking-Mukden Railway and now engineer-in-chief of the southern (British) section of the Tientsin-Pukow Railway, was engineer in charge of the construction of this line.

Part 5.—PHILIPPINE ISLANDS.

I. GENERAL INFORMATION.

INTRODUCTION.

To cover the railway markets of the Philippine Islands so far as the present railways are concerned is a somewhat simple matter. The need of railways for the development of the large possibilities of these islands is a much more difficult and important subject, which, however, it is not the purpose of this report to consider.

An effort will be made under the several headings of "general information" to state very briefly some of the salient features that affect, more or less, transportation conditions now and in the future. An attempt will also be made to indicate some of the possible developments of the islands, particularly with respect to supplying the United States with tropical products such as hemp, cocoa, rubber, and similar articles of which the American people are very large users but of which they control a very small part of the world's present supplies.

AREA AND POPULATION.

The islands, numbering 3,141, are located between 5° and 22° north latitude and 117° and 127° east longitude. The area of all the islands totals 115,026 square miles. Luzon, lying near the north, and Mindanao, lying near the south of the archipelago approximate about 40,000 and 36,000 square miles, respectively. The nine next largest islands range from 5,000 to 1,000 square miles each, and there are 275 islands with an area of less than 1½ square miles each.

To give an idea of the extent of these islands, it may be said that if the most northerly island were placed on Sault Ste. Marie, Mich., the most southerly island would be located near Birmingham, Ala., the most easterly part of Mindanao would come near Pinehurst, N. C., and the most southwesterly island would be in southeastern Arkansas. Manila would come near South Bend, Ind., and Zamboanga near Chattanooga, Tenn.

Prof. H. O. Beyer, who has the chair of anthropology in the University of the Philippines, estimated the population at about 9,503,370, from data gathered in 1915 and 1916. Of this population it is estimated that less than 75,000 are what might be called foreigners. The remainder are natives, there being more than 25 different tribes, of which there are many subdivisions. Of the foreigners about two-thirds are Chinese, and nearly one-half of the remainder consists of other Asiatics, mostly Japanese. There are about 5,000 Americans in the Philippines and nearly as many Spaniards and other Europeans of all nationalities.

AGRICULTURAL AND PASTORAL PRODUCTS.

Agriculture in some form is the principal occupation of the natives, but the methods are mostly primitive. It is estimated that there are more than 12,000,000 acres of cleared arable land, but that only about 7,000,000 acres are actually under cultivation. The leading crops, in the order of their value, are rice, hemp (abaca), sugar cane, coconuts, corn, and tobacco.

Rice is the chief food of most of the people and, strange as it may seem for such a productive country, it is one of the large items of imports even when crops are normal; more than \$6,500,000 worth of rice was imported in 1915 and 1916 and \$5,390,000 worth in 1917. The land, as a rule, is very responsive to scientific treatment and its productivity could be greatly multiplied by modern methods, but the native farmers, unless persistently led, are slow to take advantage of improved implements and practices.

Plantations of rubber are being started, particularly on the island of Mindanao, and are reported to be progressing very satisfactorily. A large part of the entire area (especially on the larger islands) is as productive as any part of the Tropics and under intensive modern methods will give results equal to the best obtained in other countries—comparable to those in Java, to which the island of Mindanao is in many respects similar.

Pastoral products are of minor importance and, although general conditions are favorable for stock raising in parts of the islands, the prevalence of destructive animal diseases has made this hazardous in the past. Hardy animals like goats, swine, and sheep are found in considerable numbers, but their quality is inferior, since little or no attention has been paid to the breeding. The Indian cattle recently introduced show a strong resistance to the native cattle diseases. A considerable amount of meat and dairy products is imported from the United States, Australia, and New Zealand.

FORESTRY PRODUCTS.

The Bureau of Forestry of the Philippine government estimates that 40 per cent of the entire area of the islands is covered with cogon grass (*Imperata exaltata*), which is useless for grazing, is a fire menace, destroys the productivity of the land, and, worst of all, is a breeding place for the destructive locust.

This condition has been caused largely by the abandonment of the land after it has been used for agricultural purposes, especially by the "Caingin" system. The Bureau of Forestry is working to correct this condition, but not with particularly encouraging results up to the present time. Reforestation of some of these areas is being attempted in a small way by sowing a tree, ipit-ipil (*Leucaena glauca*), which, it has been found, will kill out cogon grass within two years. This tree has proved the most successful of any used thus far.

The 40 per cent mentioned, with the 15 per cent area of cleared arable lands, leaves 45 per cent that can be considered as forest land, of which it is estimated that two-thirds (30 per cent of the whole area) is original forest land and the remaining one-third second-growth timber; most of this last is of doubtful value. The cutting of timber is now done under license from and supervision of the Bureau of Forestry. The remaining forests contain some very good

timber and are a very valuable asset. If properly handled they will supply the greater part of the requirements of the islands and furnish considerable amounts to be exported for an indefinite number of years. The value of timber exported in 1915 was \$235,275 and in 1916 \$480,644.

MINERAL PRODUCTS.

The total mineral products are of minor importance. There are known to be considerable deposits of coal and some quantity of iron, but neither of these have been properly proved to determine their quantity or quality. A company was organized early in 1917 with a capital of \$25,000,000 (the Philippine government owning 51 per cent of all stock issued) to prove and develop the coal resources of the islands. Mr. Vicente Madriga is general manager and Mr. Hix (American) is assistant general manager and chief engineer. In 1914 the value of the coal imported was \$1,749,745; in 1915, \$1,432,520; in 1916, \$1,303,994; and in 1917, \$1,538,235. About \$125,000 worth of this came from the United States in 1914 and 1915, but none in 1916 or 1917.

MANUFACTURING.

Such manufacturing as is done might be called native and special. There is very little manufacturing, aside from some special lines, that can be considered modern, particularly as regards heavy industries. Both the native and the special industries generally require the maximum of hand work and usually little machinery except some of the simpler kinds. Hat and basket making are typical of the native industries, which are largely household occupations and require almost no machinery. Lace making and tobacco manufacturing are the two best examples of the special industries, although there are special crafts, such as slipper and shoe making, most of which is done in small shops.

COMMERCE.

The trade of the Philippines consists largely in exporting the agricultural products above mentioned, mostly in a raw or semiraw form, and the importation of manufactured goods, for which the islands are very largely dependent on the outside world. The main volume of the trade of the islands is carried on through a relatively small number of large commercial houses, which constitute the agencies through which the handling of exports and imports is carried on. It is said that 90 per cent of the commercial activities of the Philippines are in the hands of the foreigners, numbering less than 75,000, as already stated. A network of small traders constitute the distributing and collecting medium for the various parts of the islands.

The Chinese play a very large part in the business of the islands, particularly in the sale to the natives of manufactured products, such as dry (soft) goods. It is also an interesting fact that the Chinese own much of the best property in the business section of the city of Manila.

The following data, taken from the annual reports of the Bureau of Customs of the Philippine government, show that the volume of

foreign trade is really very large, especially when the small trading capacity of the average native is considered:

Calendar years.	Imports.	Exports.	Total trade.	In favor of islands.	Against islands.
1899.....	\$19,192,986	\$14,846,582	\$34,039,568	.....	\$4,341,431
1900.....	24,803,779	22,960,375	47,864,152	.....	1,873,496
1905.....	30,050,550	33,454,774	63,505,324	\$3,404,224	.....
1910.....	49,719,361	40,628,463	90,347,824	.....	9,090,898
1912.....	61,067,901	54,923,300	116,991,201	.....	6,744,601
1913.....	53,312,786	47,772,956	101,085,742	.....	5,539,830
1914.....	48,588,653	48,689,634	97,278,287	100,981	.....
1915.....	49,312,184	53,813,004	103,125,188	4,500,820	.....
1916.....	45,498,338	60,937,183	115,435,521	24,436,845	.....
1917.....	65,796,830	56,654,307	122,451,137	29,837,481	.....

PERCENTAGES OF TRADE WITH SPECIFIED COUNTRIES.

Countries.	Imports.				Exports.			
	1913	1914	1915	1916	1913	1914	1915	1916
United States.....	Per cent. 50	Per cent. 50	Per cent. 53	Per cent. 50	Per cent. 35	Per cent. 50	Per cent. 44	Per cent. 51
United Kingdom.....	10	9	7	6	19	15	17	18
Japan.....	6	7	8	11	8	6	7	7
French Indo-China.....	5	7	16	14	.....	.....	.....	.....
China and Hongkong.....	5	6	5	6	10	6	9	9
Australia.....	5	5	3	2	1	1	1	1
Germany.....	6	5	.....	4	2	.....	.....	.....

From 1899 to 1904, inclusive, the balance of trade averaged about \$3,000,000 a year against the islands, but from 1905 to 1909, inclusive, it averaged nearly \$4,000,000 a year in favor of the islands. The period from 1899 to 1915 gave an aggregate balance against the islands of \$18,810,591, but the years 1916 and 1917 have changed this to a balance in favor of the islands amounting to \$35,487,735.

At this point it seems proper to correct the very general misunderstanding concerning the financial situation between the United States and the Philippine Islands. The only expenses that have been borne by the United States are those of the military and naval establishments; the civil government expenses and all the insular improvements have been paid for from the revenues of the Philippine government.

From the above table it will be seen that more than 50 per cent of the imports came from the United States for the four years shown. Imports from all other countries are charged considerable duties, while those from the United States enter free. This is a very important advantage. At present, with the scarcity of shipping and the high freight rates, Japan is enjoying an opportunity of which it is taking advantage, as is shown by its constantly increasing share of the business. One reason for Japan's advance in this trade is to be found in the adaptability of many of its products to the requirements of the islands. Rice, largely from French Indo-China, and iron and steel products, including machinery, are the next largest items of importation after cotton goods. The iron and steel products are of wide variety, and the proportion from the United States has averaged nearly 75 per cent for a period of years past. The value of the iron, steel, and machinery imports for five recent years has been as follows:

1913, \$8,613,904; 1914, \$6,983,444; 1915, \$4,430,071; 1916, \$3,763,239; and 1917, \$5,927,563. Other imports, in the order of their value, are: Chemicals, drugs and medicines, coal, food products, leather goods, oils, and silks.

Hemp is much the most important export. About 50 per cent of this goes to the United States and the next largest amount to the United Kingdom, with Japan third. The value of the exports for five recent years has been as follows: 1913, \$21,686,785; 1914, \$19,765,602; 1915, \$21,644,847; 1916, \$27,224,955; and 1917, \$47,787,860.

Sugar is the article next in importance. More than 50 per cent of the exports usually go to the United States. The value of the sugar exports for five recent years has been as follows: 1913, \$7,032,889; 1914, \$11,059,593; 1915, \$11,310,215; 1916, \$18,587,593; and 1917, \$12,277,679.

Copra and coconut products are third in value, and again about 50 per cent of the exports go to the United States.

Tobacco products are fourth in value, and here again the United States takes about 50 per cent.

Other exports, in the order of their value, are maguery, embroideries and hats, lumber, and cordage.

PORTS AND TRADE CENTERS.

Manila is the seat of the Philippine government and in every way is the most important port and trade and manufacturing center. It is located in the southern part of the island of Luzon, somewhat north of the center of the archipelago, being accessible from all parts of the islands. In an air line, it is about 500 miles from Hongkong, 1,200 miles from Shanghai, 1,600 miles from Kobe, 1,800 miles from Yokohama, and a little more than 6,000 miles from San Francisco. Via the Panama Canal it is about 11,500 miles from New York and about 14,000 miles from Liverpool.

While Manila is not the only port of entry, it is much the most important, particularly for imports. The inner harbor is protected by a breakwater, inside which vessels handle cargo by lighters; this is done with much of the cargo going to the Pasig River and its connecting canals. There are also five modern piers at which the largest vessels plying the Pacific can dock. There are several large modern warehouses near these docks. In fact, the port of Manila is excellent in every respect and capable of handling an immense volume of business.

The most important of the other ports are Iloilo, Cebu, and Zamboanga, in the order named. All are south of Manila.

Much has been said in regard to making Manila a "free port," and there is much to commend this plan.

COASTAL SHIPPING.

While some over-sea staple cargo is shipped from the ports of Iloilo, Cebu, and Zamboanga, the great bulk of all over-sea shipments goes through the port of Manila. Coastwise shipping is the interisland transportation problem of greatest importance. The very long coast line of the islands and their natural conformation make it practicable

to have the great number of harbors, mostly small, that now exist and the number of which will increase as the business grows. However, there will have to be connected with this coastwise shipping (particularly as the development of the islands proceeds) a system of short-haul railways, many of which should be similar to the so-called tramways of Java and the light railways of Japan, Chosen, and Formosa.

There are a number of different concerns engaged in this coastal shipping. Some of the runs start at Hongkong, making Manila the main port of call, while there are other lines that make the run from Manila. The amount of this shipping will have to be substantially increased as the development of the islands proceeds.

GENERAL RAILWAY SITUATION.

At present the railway facilities of the islands are limited, to say the least. The Manila Railroad Co. (Ltd.), now controlled and operated by the Philippine government, has 573.6 miles in service and about 75 miles nearing completion on the island of Luzon. The Philippine Railway Co. has 72.3 miles of line on the island of Panay and 59.4 miles on the island of Cebu, a total of 131.7 miles. This total of 715.3 miles, all of 3-foot 6-inch gauge, comprises all the commercial railways now in service in the entire archipelago, with less than 100 miles under construction. The Manila Electric Railway & Lighting Corporation has a total of 45.1 miles of street railways and interurban lines in and around the city of Manila. This is the only system of electric railways of any kind in the islands. The only other land transportation concern of any magnitude whatever is the Benguet Automobile Line, running a line of large motor buses from the so-called "summer capital" of Baguio to Mangaldan—a drop of 4,800 feet in elevation—where connection is made with the main line of the Manila Railroad. A very considerable amount of really good roads has been built in several parts of the islands. While these are very valuable, it is doubtful whether they will provide the transportation needed to develop to best advantage the heavy agricultural products, especially hemp, sugar, and coconut products.

It appears that a matter of much importance to be considered in the development of the Philippine Islands is the adoption of a comprehensive system of main railways for the larger islands, supplemented by light railways. It would admittedly be much better to have this development carried out under a well considered and worked-out program, instead of by the haphazard, piecemeal construction that will otherwise result.

II. MANILA RAILROAD CO. (LTD.).

LOCATION AND EXTENSIONS.

The Manila Railroad Co.'s system of railways is located in the central, western, southern, and southeastern portions of the island of Luzon. The main terminal is at Manila. The part lying north of Manila is known as the Northern Lines; the main line runs a little west of north from Manila through Dagupan to San Fernando, a distance of 158.2 miles, and, in addition, there are 148.5 miles of branches, making a total of 306.7 miles of railway in the Northern Lines. The part lying southeast of Manila is known as the Southern Lines; the main line runs from Manila to Calanay, a distance of 117 miles, and there are 149.9 miles of branches, making a total of 266.9 miles of railway in the Southern Lines. The total for the system is 573.6 miles of route, all of 3-foot 6-inch gauge.

The extensions under construction are almost entirely additions to the Southern Lines, which will be extended to the most southerly part of the island of Luzon.

The Manila Railroad Co. (of New Jersey) controls the Manila Navigation & Transportation Co., but no further mention will be made of this concern, since its operations are conducted separately from those of the railway.

PRESENT OWNERSHIP AND CONTROL.

After extended negotiations the control of these lines was taken over by the Philippine government January 1, 1917, by the purchase of all the outstanding common and preferred stock and the guaranty of the outstanding bonds. The status of the corporation was retained, and the operation of the lines was continued, with only a change in the board of directors and the principal executive officers. This arrangement was continued until January 1, 1918, when further changes were made—the president of the Philippine Upper House (Senate) also becoming president of the railway and the director of the Bureau of Public Works assuming the duties of general manager of the railway. This, in a way, merges the administration of the railway with the Bureau of Public Works, but the corporation status of the railway is still retained.

HISTORICAL SURVEY.

The Manila Railroad Co. (Ltd.) was registered December 13, 1906, under the English laws as a successor to the original Manila Railway Co., which was incorporated January 25, 1888, to take over a concession from the Spanish Government for a line of 122 miles for a term of 99 years to run from April, 1887. The new company was incorporated as an outcome of the negotiations with the United

States to obtain a settlement of the railway's claims against the Government arising out of the developments in the Philippine Islands from 1897 to 1899. In addition, there was formed the Manila Railroad Co. (of New Jersey), which took over all the properties of the original Manila Railway Co. (English) and was granted a perpetual concession. This company which took the place of the old English company holding the concessions from the Spanish Government was organized in 1906 under the laws of the State of New Jersey and holds, subject to the terms of concessionary grants or contracts, concessions for approximately 350 miles of lines designated as the Northern Lines and approximately 470 miles of line called the Southern Lines. These lines, totaling about 820 miles, were all to be on the island of Luzon and to the north and south (southeast) of Manila. One very specific requirement of the concessions was that the two systems were to be kept separate and distinct and to be constructed, maintained, and operated and their books and acts kept as if the lines were owned by separate and distinct companies. The two systems were to have (and do have) a common terminus in Manila and to enjoy every facility for free exchange of traffic, including a port line in Manila, connecting with the water front wharves and warehouses, which was constructed by the government.

The concessions provided that there should be paid annually for a period of 30 years an amount equal to 0.5 per cent and for 50 years thereafter an amount equal to 1.5 per cent of the gross earnings of the company in lieu of all taxes of every name and nature on the franchises, earnings, and all other property owned or operated by the company under its concessions. The concession also had the very important provision that all materials and equipment imported for the company's lines should be admitted free of duty.

CAPITAL OBLIGATIONS.

Of the authorized \$3,500,000 common stock and \$6,500,000 preferred 7 per cent stock for the Northern Lines, there was outstanding, previous to the purchase by the Philippine government, \$2,130,700 of the former and \$3,652,800 of the latter—a total of \$5,783,500. Of the authorized \$7,500,000 first mortgage 6 per cent gold bonds and the \$12,500,000 second mortgage 7 per cent gold bonds for the Northern Lines, each issue maturing in 1956, there was outstanding, previous to the purchase by the government, \$4,330,000 of the former and \$7,716,000 of the latter—a total of \$12,046,000.

For the Southern Lines there was no stock outstanding, and of the authorized \$30,000,000 first mortgage 4 per cent gold bonds there was outstanding \$10,575,000. The maturity of this issue of bonds was extended from 1839 to 1859 when the control was taken over by the government. The outstanding bonds for the system totaled \$22,621,000, or more than \$39,000 per mile of line in service, although this includes some of the expenses already incurred on the less than 100 miles of additional line under construction at that time.

In the balance sheets for December 31, 1915, the Northern Lines of the operating company, the Manila Railroad Co. (of New Jersey), showed a liability of \$3,946,441 to the holding company, the Manila Railroad Co. (Ltd.), this being a result of the accrued annual deficits. The Southern Lines showed a liability of \$2,838,500 due the Philip-

pine government for advances to meet the annual deficits and a liability of \$3,284,918 of this character for the Southern Lines, resulting in a total of \$7,230,609 for the system, which can be termed accumulated deficit.

INVESTMENT ASSETS.

The cost of road and equipment and the general expenses on December 31, 1915, are shown by the following table for the Northern and Southern Lines and for the system as a whole; these figures substantially represent the property at the time it was taken over by the government:

Items.	Northern Lines.	Southern Lines.	Total.
Cost of road.....	\$14,698,634	\$7,416,302	\$22,114,936
Cost of equipment.....	1,389,818	2,078,988	3,468,806
General expenses.....	1,010,197	2,183,928	3,194,125
Total investment assets.....	17,098,649	11,679,218	28,777,867

This represents a cost of \$55,685 per mile for the Northern Lines and \$43,825 for the Southern Lines, or an average of almost exactly \$50,000 a mile for the system. When one considers the 3-foot 6-inch gauge and the small amount of rolling stock this seems to represent a rather high investment.

TRAFFIC.

For the year ended December 31, 1915, the last year for which figures were available when the writer was in Manila in April and May, 1917, the earnings for the Northern Lines were 64 per cent from passenger and 36 per cent from freight business. On the Southern Lines the division was 66 and 34, making practically 65 and 35 for the system as a whole.

Passengers are carried first, second, and third class on all the lines. On the Northern Lines, in 1915, 1 per cent of the passengers rode first class, 1.1 per cent second class, and 97.9 per cent third class. The earnings were about 5 per cent from first class, 4 per cent from second class, and 91 per cent from third class. The average ride for all passengers was 19.24 miles, and the average earnings from all passengers were 1.65 cents per mile. A total of 2,357,341 passengers were carried during the year. On the Southern Lines, of the 2,031,651 passengers carried, 0.7 per cent were first class, 0.9 per cent second class, and 98.4 per cent third class. The average ride was 16.72 miles, and the average earnings per passenger mile were 1.62 cents. The earnings for the Southern Lines were not shown by classes.

The first-class fares average about 3 cents a mile, the third-class fares a little more than 50 per cent of the first-class fares, and the second-class over 75 per cent of the first class. One hundred and ten pounds, 88 pounds, and 66 pounds of baggage are carried free for the respective classes. The larger number of first and second class passengers, the longer ride, and the higher average of earnings per passenger mile on the Northern Lines are almost entirely the result of the special travel to Baguio.

On the Northern Lines, during the year 1915, 438,369 tons (of 2,000 pounds) of freight were moved, from which the total revenue was \$465,323. The average haul was 56.1 miles, and the average earnings per ton-mile were 1.114 cents. Agricultural products constituted 58 per cent, manufactured products 9.5 per cent, and forest products 5 per cent. Materials for the government amounted to 18.4 per cent.

The Southern Lines handled 305,801 short tons. The average haul was 39.9 miles, and the average earnings were 1.536 cents per ton-mile. Agricultural products constituted 64.3 per cent, forestry products more than 14 per cent, and manufactured products 12.5 per cent. Animal products form about 4 per cent on all lines.

WORKING RESULTS AND LOSS.

The following table shows the financial results for the year 1915, the most recent figures available when the writer was in Manila:

Items.	Northern Lines.	Southern Lines.	Total.
Gross corporate revenue.....	\$1,400,225	\$1,066,689	\$2,463,914
Operating ratio..... per cent..	60.2	71.7	65.0
Operating expenses.....	\$790,703	\$664,781	\$1,455,484
Taxes.....	9,277	6,425	15,702
Total.....	799,980	671,206	1,471,186
Gross corporate income.....	600,245	392,483	992,728
Interest charges.....	\$11,667	\$49,855	1,331,522
Other income charges.....	5,690	37,298	42,988
Total.....	817,357	587,153	1,404,510
Loss.....	217,112	194,670	411,782

For the year 1917, the first year under government operation, the press reports state that the loss was converted into a profit of about \$400,000. During that year a considerably increased volume was also reported.

OPERATING METHODS.

Train-running methods conform strictly to the British "station-master" system, referred to at length in the Chinese and Japanese sections of this report. The small amount of signaling is along the lines of the British Board of Trade practice and as simple as it is possible to make this system of signaling. With the class of employees available, consisting almost entirely of natives in the train and station service, there is little doubt that this is the best method of operation, and government operation will be an added reason for continuing this arrangement.

EMPLOYEES AND WAGES.

The following table shows the number of general officers and all other employees, the number of days worked, the total yearly com-

pensation, the average daily compensation, and the average yearly compensation; the figures are for the year 1915:

Classes of employees.	Number.	Total days worked.	Total yearly compensation.	Average daily compensation.	Average yearly compensation.
NORTHERN LINES.					
General officers.....	6	2,122	\$40,500	\$19.086	\$6,750.00
All others.....	2,768	963,936	512,082	.531	185.0
SOUTHERN LINES.					
General officers.....	9	2,845	8,587	3.018	954.11
All others.....	2,583	533,483	254,018	.476	98.34
Total of "all others".....	5,351	1,497,419	766,100	.511	142.38

The average daily wages of the employees classified as "all other" and the yearly wages for this class on the Northern Lines give the best idea of the wage situation. It will be noticed that the employees on the Northern Lines worked nearly 350 days during the year, while on the Southern Lines they worked less than 207 days. It will also be noticed that the wages on this system are considerably higher than the average on the railways in China, Japan, Chosen, and Manchuria, as shown by the other sections of this report.

ROADWAY AND TRACK.

On account of the large number of openings required to take care of the excessive rain that falls at times, and the difficulty of getting across marshy ground (which occurs frequently), location and construction are rather troublesome and expensive.

On December 31, 1915, on the Northern Lines there were 902 bridges, averaging 42.5 feet in length, of which 517 were wooden or combination structures; many of these were approaching the time when they would need to be renewed and when it would be desirable to replace them with permanent structures. On the Southern Lines there were 428 bridges, averaging 58 feet, of which 244 were wooden structures. On the Northern Lines the permissible maximum axle load is 29,120 pounds and on the Southern Lines 31,600 pounds. In addition, there are 582 culverts on the Northern Lines and 1,374 on the Southern Lines, showing the great number of openings required.

Most of the rail in all tracks is 60-pound, and the fastenings, frogs, switches, and other track appliances are all along the lines of British practice in China. Most of the cross-ties are now of native timbers. These cost \$0.955 in 1915 on both the Northern and Southern Lines. Bridge ties cost \$1.82 on the Southern Lines, where there are a number of lumbering operations, and \$2.93 on the Northern Lines, part of whose ties came from the northwestern United States or western Canada.

The track is fairly well ballasted with various materials, from engine cinders to gravel, with some broken rock.

LOCOMOTIVES.

There are 69 locomotives on the Northern Lines, ranging in weight (exclusive of tender) from 31,400 pounds to 130,000 pounds and from type OO to oOOoo and oOOO-OOOo—the latter intended for use on the Baguio line. On the Southern Lines there are 39 locomotives, ranging in weight (exclusive of tender) from 43,700 pounds to 130,000 pounds and from type OOO to oOOOoo. The OO-type locomotives have now been in service about 30 years, and not only these but all other locomotives ever purchased are still in service. This condition is in accordance with the general practice of the Far East to get a very long life out of all rolling stock.

Considerable numbers of the locomotives are superheated; on these the Wakefield superheater lubricator is used. The Detroit lubricator is generally used for saturated steam. The Dreadnaught vacuum injector is used on all locomotives, as all power brakes are of vacuum type.

All locomotives are of British construction, except a relatively small number that were furnished from the United States but were built largely to conform to British specifications and practice. It has been the practice to use noncorrosive materials for fire-box construction, but a change was being made to iron when the writer was in Manila. There is a good deal of corrosive water on the lines, and some use had been made of boiler compounds, but it was stated that results had not been satisfactory, particularly in the superheated locomotives, where deterioration of the noncorrosive materials had occurred.

During 1915 the fuel for locomotive use cost \$5.78 per short ton. This cost was substantially increased in 1916 and again increased in 1917, but the detailed figures were not available when the writer was in Manila.

Figure 39 shows the locomotive drawing the Baguio Special, the weight of which (exclusive of tender) is 93,200 pounds, with a tractive effort of 15,600 pounds. This picture shows the type of coupler, buffer, and vacuum hose connection and also something unusual in British practice—a bell on the locomotive.

The following table shows the amount and classification of the rolling stock of the Manila Railroad Co.:

Rolling stock.	Northern Lines.	Southern Lines.	Total.
LOCOMOTIVES.			
Class A2, OO.....	5	0	5
Class A3, OOO.....	7	7	14
Class A4, OOOO.....	0	3	3
Class B4, OOOOo.....	0	5	5
Class C3, OOOOo.....	5	8	13
Class D3, oOOO.....	20	11	40
Class E2, oOOO.....	15	0	15
Class F2, oOOOo.....	5	0	5
Class F3, oOOOo.....	0	5	5
Meyer special, oOOO-OOOo.....	3	0	3
Total.....	60	39	108

Special Agents Series No. 180.



FIG. 39.—LOCOMOTIVE DRAWING BAGUIO SPECIAL, PHILIPPINE ISLANDS.



FIG. 40.—BAGUIO SPECIAL LEAVING STATION.

LOCOMOTIVES.

There are 69 locomotives on the Northern Lines, ranging in weight (exclusive of tender) from 31,400 pounds to 130,000 pounds and from type OO to oOOoo and oOOO-OOOo—the latter intended for use on the Baguio line. On the Southern Lines there are 39 locomotives, ranging in weight (exclusive of tender) from 43,700 pounds to 130,000 pounds and from type OOO to oOOOoo. The OO-type locomotives have now been in service about 30 years, and not only these but all other locomotives ever purchased are still in service. This condition is in accordance with the general practice of the Far East to get a very long life out of all rolling stock.

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Class A3, OOO.....	7	7	14
Class A4, OOOO.....	0	3	3
Class B4, OOOOo.....	0	5	5
Class C3, oOOOoo.....	5	8	13
Class D3, oOOO.....	29	11	40
Class E2, oOOo.....	15	0	15
Class F2, oOOoo.....	5	0	5
Class F3, oOOOo.....	0	5	5
Meyer special, oOOO-OOOo.....	3	0	3
Total.....	69	39	108

Special Agents Series No. 180.



FIG. 39.—LOCOMOTIVE DRAWING BAGUIO SPECIAL, PHILIPPINE ISLANDS.



FIG. 40.—BAGUIO SPECIAL LEAVING STATION.



FIG. 41.—OLDEST TYPE OF PHILIPPINE THIRD-CLASS PASSENGER CAR (SIDE ENTRANCE).



FIG. 42.—TYPICAL PHILIPPINE FOUR-WHEEL GOODS WAGON.

Rolling stock.	Northern Lines.	Southern Lines.	Total.
PASSENGER CARS.			
First-class coaches.....	41	16	57
Second-class coaches.....	80	64	144
Dining cars.....	1	0	1
Parlor cars.....	1	0	1
Sleeping cars.....	1	0	1
Baggage, express, and mail.....	35	5	40
Special cars.....	2	0	2
Total.....	161	85	246
FREIGHT CARS.			
Box.....	591	420	1,011
Flat.....	132	204	336
Stock.....	33	24	57
Coal.....	59	17	76
Refrigerator.....	9	2	11
Other cars in freight service.....	77	0	77
In company service.....	15	13	28
Total.....	916	680	1,596

PASSENGER AND FREIGHT CARS.

The above table shows the amount of passenger and freight car equipment on the Northern and Southern Lines.

The passenger equipment ranges all the way from old and very light four-wheel side-entrance carriages, as shown in figure 41, to some modern and robust regular and special equipment, as shown by figure 40. All the passenger stock on the Northern Lines is equipped with vacuum train brakes, and on the Southern Lines all vehicles are so equipped except the five express, baggage, and mail cars. Figure 41 shows the type of coupling, buffer, and vacuum brake hose used on all rolling stock. The vacuum brake hose must be strongly spiraled inside to prevent collapsing.

The freight cars are very largely of the goods-wagon type, especially the box, stock, and refrigerator classes. The average capacity of the freight cars on the Northern Lines is 11.2 short tons and on the Southern Lines 18.4 short tons; 14.2 short tons is the average for all freight cars.

Practically all of the rolling stock is of British manufacture and built in accordance with typical British standards and practice, especially the tired wheels on all classes of cars.

On the Northern Lines only 84 of the total of 916 freight cars are equipped with vacuum train brakes. On the Southern Lines 345 of the 680 are so equipped, including 250 of the 420 box cars.

WORKSHOPS.

Workshops for the entire system are located at Caloocan, on the Northern Lines, about 5 miles from the main station at Manila. This is also where the company residences are located for the contract staff. These shops are reasonably well arranged and equipped for the handling of all kinds of repairs to all classes of rolling stock, but are not suitable for the manufacture of equipment except the assembling of heavy rolling stock and possibly the building of some of the lighter classes of goods wagons. About 500 men are employed, and it is interesting to note that the Chinese are the most useful all-

Special Agents Series No. 180.



FIG. 41.—OLDEST TYPE OF PHILIPPINE THIRD-CLASS PASSENGER CAR (SIDE ENTRANCE).



FIG. 42.—TYPICAL PHILIPPINE FOUR-WHEEL GOODS WAGON.

PHILIPPINE ISLANDS.

233

Rolling stock.	Northern Lines.	Southern Lines.	Total.
PASSENGER CARS.			
First-class coaches.....	41	16	57
Second-class coaches.....	80	64	144
Dining cars.....	1	0	1
Parlor cars.....	1	0	1
Sleeping cars.....	1	0	1
Baggage, express, and mail.....	35	5	40
Special cars.....	2	0	2
Total.....	161	85	246
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round workmen, particularly in the foundry. The general storeroom of the system is in close proximity to these shops, and many of the rolling-stock stores are carried in the shops storerooms.

ORGANIZATION.

The operating organization is the typical departmental or branch organization that usually goes with the "station-master" system of railway operation. Attention has already been called to the fact that operations have been, in a way, merged with the Bureau of Public Works of the Philippine government. A directory of the board of directors and the principal officials is given on page 272.

PURCHASES.

It is the policy, so far as practicable, to make all purchases in the islands—largely at Manila. This is done through a superintendent of stores, under the supervision of the general manager. The superintendent of stores is located at the main storeroom at Caloocan.

Needed articles that can not be obtained in Manila are handled through the purchasing department of the Philippine government and are usually bought by Mr. H. L. Hershey, purchasing agent for the Philippine government, located in the Whitehall Building, 17 Battery Place, New York City. Mr. Hershey also has the title of purchasing agent for the Manila Railway Co. (Ltd.).

Purchases of new rolling stock, as well as other large purchases, will be handled principally by the New York office. On account of the special requirements in the case of much of this equipment, particularly the vacuum train brakes, bidders should be specific in their tenders, and when not furnished with the requisite data should insist on very definite information as to what is wanted.

III. PHILIPPINE RAILWAY CO.

LOCATION OF LINES—SOURCE OF CAPITAL.

One section of the Philippine Railway Co.'s lines is located on the island of Panay and extends from Iloilo, the port of second importance in the Philippines, to Capiz, on the north end of the island, a distance of 59.4 miles. The other section is on the island of Cebu and extends from Argao, on the east coast of the south end of the island, through Cebu, the port of third importance, to Dango, on the east coast of the north end of the island, a distance of 72.3 miles. The present mileage thus totals 131.7, all of 3-foot 6-inch gauge.

The financing and construction of these lines was carried out by J. G. White & Co., of New York City, and they have since been operated as one of this company's activities. The capital was largely, if not entirely, from American or local Philippine sources.

HISTORICAL SURVEY—CAPITAL OBLIGATIONS.

This company was chartered in perpetuity March 5, 1906, in Connecticut to construct (under a concession granted July 13, 1906, by the Philippine government in accordance with acts of Congress of the United States and approved by the Secretary of War) lines of railway in the Philippine Islands, as follows: Island of Panay, 100 miles; island of Negros, 100 miles; island of Cebu, 95 miles. The concession fixes the company's tax rate at 0.5 per cent of the gross earnings for a period of 30 years and at 1.5 per cent for 50 years thereafter, these payments to be made in lieu of all other taxes.

Under the terms of the concession the Philippine government guarantees interest on bonds issued to the extent of 95 per cent of the cost of construction of the lines. Of the authorized \$15,000,000 of 4 per cent 30-year gold bonds, \$8,551,000 was issued in 1907 under the above terms. These are to mature July 1, 1937, or they may be drawn by lot and redeemed at 110 and interest if they can not be purchased below this figure. A sinking fund for redeeming this bond issue was to be provided, as follows: 0.5 per cent on the amount of outstanding bonds from July 1, 1911, to July 1, 1920, inclusive, and 1 per cent from July 1, 1921, to date of maturity, said sinking contributions to be made before any dividends can be paid on any issues of capital stock. The balance sheet does not disclose that any such sinking fund has been established thus far. Five million dollars of common stock has been authorized and issued for the contractual rights, and this amount of stock is now outstanding.

INVESTMENT ASSETS.

The investment assets standing on the balance sheet December 31, 1915, were as follows: Cost of road, \$6,052,530; cost of equipment, \$510,996; general expenditures, \$2,586,267; total investment assets,

\$9,149,793. This shows the cost of road and equipment as almost exactly \$50,000 per mile of line and the general expenditures as \$19,325 per mile, making the investment assets total the high amount of \$69,325 per mile of line for a railway of 3-foot 6-inch gauge. No details are available of the general expenditures, particularly what part of this amount is charged to the sale of the 4 per cent bonds. The general balance sheets for December 31, 1915, show the contractual rights as carried at \$2,999,000 in the assets, and in the liabilities an item of \$2,024,487 is carried as the amount due the Philippine government under the guaranty to meet the bond interest.

TRAFFIC.

The \$350,165 revenues from transportation were derived about two-thirds from passenger business and one-third from freight traffic. A total of 1,205,325 passengers were carried, producing a revenue of \$219,015; of these 0.2 per cent were first class and contributed 1 per cent of the revenue, 14 per cent were second class and contributed 20 per cent of the revenue, and 85.8 per cent were third class and contributed 79 per cent of the revenue.

The average distance traveled was 14½ miles, and the average earnings per passenger-mile were 1.28 cents. The freight traffic totaled 92,207 short tons, of which 52.6 per cent consisted of agricultural products, 26.4 per cent of mineral products, and 13.3 per cent of manufactured goods. The total revenue from freight traffic was \$119,712, making the average earnings per ton carried \$1.298, including switching charges. The ton-mile statistics were not available.

WORKING RESULTS.

The following table shows the working results for the year ended December 31, 1915:

Items.	Amount.
Operating revenues.....	\$362,407
Operating expenses.....	243,035
(Operating ratio: 67.1 per cent.)	
Net operating revenue.....	119,372
Net revenue from outside operations.....	9,020
Other income.....	3,256
Total.....	131,648
Taxes.....	2,995
Gross corporate income.....	128,653
Interest charges.....	342,040
Other income deductions.....	1,265
Net corporate loss.....	214,652

EMPLOYEES AND WAGES.

The following table shows the number of employees, the days worked, and the compensation for the year 1915. This shows a higher rate of wages than for any other railway covered by this

report, but it will be noted that the number of employees is only 5 per mile of line, which is lower than for any other line:

Employees.	Number.	Days worked.	Compensation for year.	Daily average.	Yearly average.
General officers.....	5	1,895	\$19,562	\$10.32	\$3,910.47
All others.....	660	207,997	135,968	.65	206.03

ROADWAY AND TRACK.

These lines are well located and constructed and, with the exception of a piece of 1½ per cent grade, the maximum grade is 1 per cent. Out of a total of 330 openings, totaling 17,725 feet in length, 314, totaling 16,525 feet in length, are permanent structures, and 16, totaling 1,200 feet, are wooden trestles. The track is laid with 70 and 60 pound rails, and the ties are now mostly Philippine hardwoods, which cost 86.5 cents per tie in 1915. All rail fastenings, frogs, switches, and track appliances are along the lines of American standards and practice.

LOCOMOTIVES.

The lines have a total of 15 locomotives. Twelve of these are type 0000, weighing (exclusive of tender) 86,500 pounds each; they are used for general road service in hauling freight, passenger, and mixed trains, the greater part of the road mileage being made by mixed trains. The other three are type 000 switching engines, weighing (exclusive of tender) 64,400 pounds each. These locomotives are all of American manufacture and built along the lines of American standards and practice. Fuel on these lines, delivered to the engine, cost \$4.56 per short ton during the year 1915, but the cost was greatly increased during the years 1916 and 1917.

PASSENGER AND FREIGHT CARS.

The passenger and freight car equipment is as follows: Passenger cars—Parlor and first class combined, 1; first and second class combined, 7; second class, 12; third class, 21; second class and baggage, combined, 6; other cars in passenger service, 2; total, 49. Freight cars—Box, 82; flat, 43; stock, 6; coal, 4; Rodgers ballast, 57; derrick, 2; caboose, 1; other road cars, 4; total, 199.

The average capacity of all freight cars is 58,300 pounds, of the box cars 45,000 pounds, of the flat cars 76,200 pounds, and of the coal cars 56,000 pounds. Forty-seven of the 49 passenger cars are equipped with air brakes and automatic couplers, and all but 4 of the box cars of the freight equipment are provided with air brakes and automatic couplers. This equipment is all of American manufacture and is along the usual lines of practice, including chilled cast-iron wheels.

WORKSHOPS.

The shops of these lines are located at Iloilo, and during the year 1915, in addition to the railway company's own work, did commercial

shop work to the extent of \$47,880, from which an income of \$9,020 was earned.

The organization of these lines more nearly approaches the American divisional arrangement than does that of any of the other railways carried by this report. A directory of the principal officials is given on page 272.

PURCHASES.

The local storekeepers are authorized to make purchases of small articles needed immediately. Other materials and supplies that can be obtained in the Philippines are handled by the purchasing agent, supervised by the general manager; purchases of importance are usually given personal attention by the latter. Purchases of equipment that can not be obtained in the Philippines are handled by J. G. White & Co., of New York City, in connection with a large number of other properties, under the supervision of the manager of purchases, Mr. E. N. Chilson, of the J. G. White Engineering Corporation, of 43 Exchange Place.

IV. MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION— MANILA SUBURBAN RAILWAYS CO.

LOCATION AND EXTENT.

The Manila Electric Railroad & Lighting Corporation owns or controls all the street and suburban railways in and around Manila. It owns and operates 33.1 miles of street railways, as well as the electric light and power plant supplying the entire city of Manila, and also controls and operates as a subsidiary the Manila Suburban Railways Co., with 12 miles of route running from Manila past Fort McKinley to Pasig.

SOURCE OF CAPITAL AND PRESENT CONTROL.

The financing, construction, and reconstruction of these properties was carried out by J. G. White & Co., of New York, and they have since been, and are now, operated as one of the large number of properties managed by this organization. The capital for the reorganization, reconstruction, and new construction of the present plant was largely, if not entirely, from American and local Philippine sources.

HISTORICAL SURVEY—CAPITAL OBLIGATIONS.

The present company was chartered June 26, 1903, under the laws of the State of Connecticut, and acquired all the stocks and bonds of the Manila Electric Railroad & Light Co., practically all the stocks of the Union Trunk Co., and the Compañía de los Transvías de Filipinas, and more than 98 per cent of the stock of La Electricista; it also owns all the stock of the Manila Suburban Railways Co., incorporated in July, 1906, under the laws of Connecticut, to build electric railways and operate electric light and power systems along such railways in the suburbs of Manila. This last company's franchise expires in 1953.

The funded obligations of the Manila Electric Railroad & Lighting Corporation include \$3,000,000 first mortgage 6 per cent 50-year gold bonds authorized (all issued and now outstanding) and \$1,000,000 6 per cent 50-year notes authorized (all issued and now outstanding). There is an authorized amount of \$3,000,000 common stock, of which \$1,685,000 has been issued and is now outstanding. This makes the outstanding capital obligations total \$5,685,000, of which the balance sheet shows \$71,042 funded debt owned and held as investment assets.

Of an authorized total of \$2,500,000, the Manila Suburban Railways Co. has issued and now outstanding \$650,000 first mortgage 5 per cent gold bonds, with 40-year sinking fund. Of an authorized total of \$1,000,000 common stock, there is now outstanding \$530,000, all owned by the Manila Electric Railroad & Lighting Corporation. This makes the outstanding capital obligations of the Manila Sub-

urban Railways Co. total \$1,180,000. The balance sheet shows \$19,000 of the bonds deposited with trustee of sinking fund and held as investment assets.

INVESTMENT ASSETS.

The balance sheet for December 31, 1915, shows the cost of the plant of all the property of the Manila Electric Railroad & Lighting Corporation as totaling \$6,030,045. In addition, there are shown \$20,000 of stock owned in other enterprises and the above-mentioned \$71,042 of funded debt owned. The balance sheet for the same date for the Manila Suburban Railways Co. shows the cost of the plant as \$1,204,690, and, in addition, there is held by the trustee of the sinking fund the \$19,000 above mentioned.

TRAFFIC AND OTHER BUSINESS.

The system of fares on the Manila Electric Railroad & Lighting Corporation lines involves the carrying of first-class passengers at a uniform rate of 12 centavos (6 cents) and second-class passengers for 10 centavos (5 cents) for all rides, including very liberal transfer privileges. The management has given serious consideration to the adoption of a zone system of fares similar to that in use in Shanghai (see p. 138). From the writer's observation in Australia, it would seem that this might be done with much advantage to the convenience of the public as a whole and the earnings of the company; some of the rides are entirely too long for the fares charged, while, on the other hand, riding for short distances is discouraged by the uniform fare, 5 cents being a very high charge for a second-class fare in the Far East. One point that has considerable weight in this connection is the competition of the "calesa," a horse-drawn, two-wheeled vehicle, as shown in figures 44 and 45.

It is stated that there are about 6,000 of these in Manila, with a seating capacity amounting to double that of the entire equipment of the street railways. While these vehicles are supposed to have a regularly established rate of fares, the rates are in reality very variable when subject to bargaining in the presence of competition. This form of conveyance takes the place of the man-drawn jinrikisha that one finds in China and Japan and other parts of the Far East and is a very serious competitor of the electric street car.

The transportation earnings of the Manila city lines for the year ended December 31, 1915, were \$523,017, of which 20 per cent was from first-class travel, 79 per cent from second-class, and 1 per cent from freight and miscellaneous items. The transportation earnings constituted about 40 per cent of the total earnings of the corporation.

The transportation earnings of the Manila Suburban Railways totaled \$135,274, representing 80 per cent of the total earnings. First-class travel accounted for 18 per cent and second-class for the remainder; the other transportation earnings are only a fraction of 1 per cent of the whole.

WORKING RESULTS.

The last annual report available when the writer was in Manila in May, 1917, was for the year ended December 31, 1915. The significant figures are shown in the following table:

Special Agents Series No. 180.



FIG. 43.—SHELTERED WAITING STATION, MANILA STREET RAILWAYS.



FIG. 44.—TRACK RECONSTRUCTION, MANILA STREET RAILWAYS.

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FIG. 44.—TRACK RECONSTRUCTION, MANILA STREET RAILWAYS.



FIG. 45.—CENTER-ENTRANCE CAR, MANILA STREET RAILWAYS.



FIG. 46.—END-ENTRANCE CAR, MANILA STREET RAILWAYS.

MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION.

Items.	Amount.	Items.	Amount.
Operating revenues.....	\$1,317,982	Net income.....	\$360,517
Operating expenses.....	674,341	Reserves, replacements, and renewals...	73,600
(Operating ratio: 51.2 per cent.)		Dividends on \$1,685,000 common stock...	275,000
Net operating income.....	643,591	Total income deductions.....	348,600
Miscellaneous income.....	6,540	Surplus for year.....	11,917
Gross corporate income.....	650,131		
Taxes on real and permanent property..	4,887		
Coal tax.....	7,052		
Taxes on earnings.....	37,533		
Miscellaneous income charges.....	142		
Interest on funded debt.....	240,000		
Total taxes and fixed charges.....	289,614		

MANILA SUBURBAN RAILWAYS CO.

Items.	Amount.	Items.	Amount.
Operating revenues.....	\$170,717	Net income.....	\$57,311
Operating expenses.....	76,140	Reserves for replacement.....	6,400
(Operating ratio: 44.6 per cent.)		Dividends on \$30,000 common stock...	53,000
Net operating income.....	94,577	Total income deductions.....	59,400
Miscellaneous income.....	380	Deficit for year.....	2,089
Gross corporate income.....	94,957		
Taxes on earnings.....	5,146		
Interest on funded debt.....	32,500		
Total taxes and fixed charges.....	37,646		

ROADWAY AND POWER PLANT.

Some of the streets of Manila are narrow and crooked, making the building of street railways rather difficult as regards both the track and the overhead construction. In a number of instances the lines go in one direction on one street and return by an adjoining street. The tracks in busy, narrow streets are laid with 92-pound girder rail, some of which is now being replaced with a still heavier girder rail. In other districts the track is laid with 70-pound T rail. The track materials are from American sources and along American lines of standards and practice, including a considerable amount of special work. The same remarks apply to the overhead contact construction, some of which is rather complicated on account of the narrow and crooked streets.

There is one central power house, located on the Pasig River, which furnishes power for all the above railways and also all the commercial current for lighting and power in Manila and its suburbs. Fuel is handled in lighters directly to this central power house.

Figure 44 shows track reconstruction work in progress on the approaches to one of the bridges on the Pasig River.

ROLLING STOCK.

The car equipment for the city lines consists of 72 closed and 48 open passenger cars, 1 express car, 3 work cars, 1 wreck car, 1 town car, and 1 pole car, all of which are electrically equipped except 1

Special Agents Series No. 180.



FIG. 45.—CENTER-ENTRANCE CAR, MANILA STREET RAILWAYS.



FIG. 46.—END-ENTRANCE CAR, MANILA STREET RAILWAYS.

PHILIPPINE ISLANDS.

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MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION.

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Operating expenses.....	674,341	Reserves, replacements, and renewals...	73,600
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ROLLING STOCK.

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of the open passenger cars and the pole car. The suburban line equipment consists of 6 closed passenger cars and 7 freight cars, all of which are electrically equipped except 3 of the freight cars. While much of this car equipment is from American sources, a considerable part of it is of British and Belgian manufacture.

The accompanying illustrations show several types of these cars. Figure 45 shows one of the latest center-entrance cars.

The cars of this type were fabricated in the United States according to plans and were shipped knocked down to Manila, where they have been very satisfactorily assembled and completed in the company's own shops. This arrangement is of special advantage in the saving of ocean freight charges. Particular attention is called to the roof arrangement of this equipment, which is so designed in order to keep out the very heavy rains during typhoon seasons.

WORKSHOPS—ORGANIZATION.

In connection with the general offices and central car barns the city lines have a reasonably well arranged and equipped shop for inspection and the making of all classes of repairs to the equipment, including the assembling and completing of cars, as above explained. The general storerooms are located at this same place, and here there is carried a carefully selected stock of stores, as is necessary at this great distance from sources of supply.

The organization conducting the operations of these properties is similar to that in the other activities of J. G. White & Co., as is indicated by the directory of the principal officials given on page 273.

PURCHASES.

Requisitions for purchases originate in Manila and are handled under the direction of the general manager's office so far as it is practicable to obtain supplies to advantage in Manila. Such articles as can not be obtained there are ordered from the New York office of the J. G. White & Co. interests and purchases are made through the manager of purchases of the J. G. White Engineering Corporation at 43 Exchange Place, New York City.

Part 6.—CONCLUSIONS AND SUGGESTIONS.

INTRODUCTION.

In this chapter an effort will be made to summarize the conclusions of the writer's investigation and to formulate such suggestions as seem warranted. All the situations covered in this report will be referred to in general. Remarks concerning China are to be understood as applying to both China proper and Manchuria, and, unless otherwise stated, the same will be true of Japan and Chosen. The original purpose of this report was to cover the markets for railway materials, equipment, and supplies, and it is fully realized by the writer that this intention has been departed from to a certain extent, in that a considerable part of the data may be considered as referring to investments rather than markets. Circumstances, however, have seemed to justify this treatment.

PAST PROGRESS.

It is felt that the data included in this report show conclusively that China has made real progress toward a solution of its railway problems, particularly when one considers the "original conditions." One of the convincing evidences that China has made substantial progress in its railway development is to be found in the working results of the present railways, not only in cases where profits might reasonably have been expected, but also in others where they could hardly have been anticipated.

Probably the best arrangement for the railways in China would be Government ownership and operation under a strong central organization, such organization to be assisted for the present by broad-minded foreign railway experts who will work for the railway development of China as a whole instead of the limiting "sphere-of-influence" policy of the past.

Regarding Japan, it seems only necessary to say that it has passed through all the stages of its railway development until at present, from the standpoint of railway markets, it seems a question rather of competition from Japanese sources than of retaining the general trade in the Empire that the United States has enjoyed in the past. While there will continue to be markets for many materials of American manufacture, the Japanese will, of their own accord, investigate and decide as to their requirements. In short, Japan has reached the point where it is capable of carrying on its own individual railway development. This has been the object of the Japanese railway policy for a considerable number of years.

FUTURE PROSPECTS.

Japan's present ability to supply and control most of its railway requirements in normal times will no doubt be further developed,

and this also means increasing Japanese participation in the Chinese railway markets, particularly in view of the developments that Japan controls in Manchuria and the possibility of similar developments in Shantung.

Railway progress in China will undoubtedly be substantial, and if the restrictions of the "spheres of influence" and the railway loan agreements are eliminated (as in fairness to China they should be), this development may be phenomenal—especially if China, in turn, corrects some of the retarding internal conditions, such as the likin taxes and "squeeze," and eliminates the political influences and local military interferences. When the volume of business handled is considered in connection with the rather small amount of rolling stock, it becomes apparent that the administration of these lines is being handled with considerable efficiency, particularly when allowances are made for all the handicapping conditions. Improvement in working results would be brought about if some of the obvious restrictions could be broadly corrected.

CONSOLIDATION OF CHINESE GOVERNMENT RAILWAYS.

It is debatable whether consolidation or unification is the correct word to use in connection with the process that seems to be desirable for the Chinese Government Railways.

The Ministry of Communications has made considerable progress in what may be termed regulatory requirements, such as those making uniform the railway accounts, the operating organization, and, to a certain extent, the operating methods of the several railways constituting the group of lines known as the Chinese Government Railways. There has been some progress toward through handling of traffic and interchange of equipment, but very little actual progress has been made in consolidating these lines under one central administration so that they can be developed and operated as a whole to the best advantage—in which arrangement there would be a number of very real possibilities of obtaining improvement in the efficiency of both facilities and management.

In suggesting the possibilities along these lines the writer has generally been met by the question: "What about the attitude of the owners of the bonds of the railway loans with which these lines were built?" In the past this has been the principal factor in preventing the consolidation of these lines, and this, together with the claims of the several "spheres of influence," continues to block (or at least materially to hinder) the proper development of the Chinese Government Railways as a whole. It is obvious, of course, that there must be some advantage accruing to the owners of these bonds to induce them to agree to a new arrangement. To those now in control of the present concessions or loans, what are the advantages to be gained by assenting to such consolidation? In the writer's opinion, by proper consolidation of these lines the value of these bonds will be enhanced rather than endangered, particularly by reason of the fact that such a security is safeguarded by spreading it over an extensive system, the earnings of which will not be materially affected by local conditions. In addition, such action would assist in further railway development in China, which, in turn, would again enhance the security of the present loans.

The first table on page 53 shows that the investment assets of the Chinese Government Railways total \$406,741,411 Mex., not including the Kirin-Changchun Railway, which is a detached line now under Japanese control, and the Canton-Hankow line, which is not yet completed. Interest charges on the funded debt of these lines for 1916 totaled \$12,258,896 Mex., leaving a balance to net income, except deduction for permanent Chinese Government investment, of \$20,801,268 Mex., or a margin of almost 170 per cent to meet interest charges on funded debt. On lines north of the Yangtze River and the two Shanghai lines, which can be considered as a connected system, even a better showing is made. This is indicated by the first subtotal on page 53. The three lines shown last are all disconnected but will become part of the connected system when the Canton-Hankow line is completed.

When one comes to examine the investment assets and the capital liabilities, it is seen that the Chinese Government has a very substantial equity in this group of railways. The second table on page 53 is a summary of the balance sheets for the six most important lines for the year 1916 (except the Peking-Suiyuan, which is for 1915).

The following is a further summarizing of the balance sheets of the above lines, as of December 31, 1916, with the 1916 report of the Peking-Suiyuan line, which has just been received, but which makes very little change in the totals. This table shows in the columns of assets the cost of the three classes of permanent investment assets, and in the column of liabilities it shows present outstanding capital liabilities and liabilities permanently disposed of through surplus earnings:

Investment assets.	Amount.	Capital liabilities.	Amount.
Cost of road and equipment:	<i>Mex. dollars.</i>	Bonds and shares outstanding:	<i>Mex. dollars.</i>
Peking-Mukden.....	59,942,844	Peking-Mukden.....	19,756,617
Peking-Suiyuan.....	25,981,205	Peking-Suiyuan.....	
Tientsin-Pukow.....	99,803,208	Tientsin-Pukow.....	95,249,974
Peking-Hankow.....	97,807,196	Peking-Hankow.....	58,450,533
Shanghai-Nanking.....	30,484,417	Shanghai-Nanking.....	29,628,185
Shanghai-Hangchow-Ningpo.....	21,807,376	Shanghai-Hangchow-Ningpo.....	18,405,015
Total.....	335,326,246	Total.....	221,490,374
Cost of other physical property:		Permanent Government investments:	
Peking-Mukden.....	467,731	Peking-Mukden.....	23,903,393
Cost of nonphysical assets:		Peking-Suiyuan.....	22,602,737
Peking-Mukden.....	57,003	Tientsin-Pukow.....	3,589,350
Peking-Suiyuan.....	119,177	Peking-Hankow.....	40,369,381
Peking-Hankow.....	2,491,795	Shanghai-Nanking.....	3,672,671
Total.....	2,667,975	Shanghai-Hangchow-Ningpo.....	4,980,706
Total investment assets.....	338,461,952	Total.....	99,178,238
Total bonds and shares outstanding.....	221,490,374	Additions to property through surplus:	
Excess of investment assets over out-		Peking-Mukden.....	11,166,657
standing bonds and shares.....	116,971,578	Peking-Suiyuan.....	2,422,063
		Peking-Hankow.....	7,239,678
		Total.....	20,828,398
		Funded debt retired through surplus:	
		Peking-Mukden.....	9,784,667
		Peking-Suiyuan.....	1,519,801
		Shanghai-Nanking.....	353,924
		Total.....	11,658,392
		Total capital liabilities and addi-	
		tions through surplus.....	353,155,402

The conclusion to be drawn from this table is that in these six lines the Chinese Government has investment assets of \$116,971,578 Mex., not counting the working assets and the assets in the other lines, both of which will add a good deal in real value. This equity is being added to each year in the amortizing of the several loans.

The data presented seem to warrant the suggestion that, to protect the present bondholders in consolidating these lines, a consolidation mortgage is one of the practicable arrangements; and through this same means the capital could be furnished to take care of the extensions, betterments, and additional equipment, which will make these railways still better paying properties.

It has been the writer's intention not to include the Canton-Hankow Railway (or, to give it the correct name, the Hukuang Railways) in the above suggestions, for the reason that the resources pledged for the present Hukuang Lines seem adequate. It appears practicable, however, to utilize the above-mentioned equity in obtaining the additional funds that will be necessary to complete this line—undoubtedly the most needed additional line in China—and in doing so to effect the consolidation of all the Chinese Government Railways into one organic system.

The following table shows the status of the Hukuang Railways on December 31, 1916:

Investment assets.		Liabilities.	
	Mex. dolls.		Mex. dolls.
Construction expenditures.....	27,139,388	Mortgage bonds.....	67,320,900
Financial expenditures.....	19,175,974	Other secured indebtedness.....	
Working assets.....	11,038,240	Deferred credit items.....	662,901
Deferred debit items.....	10,629,299	Total obligations.....	67,982,901
Total assets.....	67,982,901		

The writer, in presenting the above suggestions, appreciates the many difficulties that would have to be overcome in making the proposed consolidation. It is felt, however, that this is the treatment which will result in the greatest and best railway development in China, when the situation is considered as a whole, and that the Chinese Government's equity, with the existing progress, renders this the best solution of a difficult situation. One of the very substantial advantages in consolidation would be the rearranging and combining of the present management and the introduction of more efficient administrative methods. There are also economies that could be effected by the joint use of existing equipment—all of which are prevented by the present restrictions. The administration of the present Chinese Government Railways, so far as the joint use of tracks and equipment is concerned, is just as strictly accounted for as though the lines were privately owned and operated.

PROGRAM OF CONSTRUCTION.

As already explained, Japan has worked out a very complete and comprehensive program of railway construction as regards both the

additions to the Government railways and the private light railways to be built under the 5 per cent subsidy law.

With the present restrictions resulting from the "spheres of influence" and the railway loan agreements, it is practically impossible for the Ministry of Communications to plan and adopt any comprehensive program of railway construction for China as a whole, though there is no doubt as to the desirability of such action. Therefore one feature of the suggested consolidation of the Chinese Government Railways should be the elimination of those restrictions and the working out and adoption of such a program.

It is particularly fortunate that so much of the present mileage has been built with the standard gauge (4 feet 8½ inches), and it is also fortunate that thus far there has been very little duplication of facilities or building of parallel lines, though the two elaborate stations at Tsinanfu and the three terminals at Peking show what may occur if the present conditions continue.

It is obvious that it would be entirely beyond the scope of the present report to attempt to outline such a program. Although some construction programs have been suggested, such as that by Dr. Sun Yat Sen's Chinese National Railway Corporation, none of them, in the writer's opinion, have been based on such an exhaustive study as the correct solution of the problem warrants and demands.

There is every reason why a carefully worked out construction program should be adopted and followed in the building of future railways in China and in the extensions and additions to the present lines. In deciding upon such a program consideration should be given to the construction of lines to develop the resources of the country, particularly fuel and iron, and the avoidance of parallel lines and lines paralleling the water transportation routes. The latter condition forms the explanation for the lack of success of certain of the present railways, since some of the water transportation lines, especially some of the native Chinese craft, carry a limited amount of freight for very low charges. A preliminary study of the situation seems to warrant the statement that in most instances lines could be located to develop the country fully, to avoid very largely the paralleling of water routes, and still to provide through rail connections between the large centers of population. It has been generally agreed that the completion of a comprehensive system of railways in China would do much to stabilize the country, particularly in connection with the suggested currency reforms.

After the completion of the text of this report, the writer's attention was called to the study of the development of the Chinese railways made by Mr. A. J. H. Charignon, a French civil engineer, who, at the time his book was published, was employed as technical adviser to the Ministry of Communications. While this study is entitled a "Program of development" of the Chinese railways, it impresses the writer rather as a very excellent reference work covering the many railway projects in China as they stood at the time this study was made (1912 to 1914). There is a large amount of useful and apparently very accurate data, particularly as to the length of the lines. The Chinese names (French version) are given with much care and consistency in the rendering. There are 21 maps showing the various projects and also a large map of China. The text is in French, and so far as is known no translation has been

made into English. For anyone making a study of the Chinese railway situation this publication affords much valuable data. The complete title is as follows: *Les Chemins de Fer Chinois, un programme pour leur développement*, par A. J. H. Charignon, ingénieur civil, conseiller technique au Ministère des Communications; H. Dunod & E. Pinat, éditeurs, 47 et 49 Quai des Grands-Augustins, Paris, 1914.

CHARACTER OF LINES.

To the writer the characteristics of the Chinese lines to be built seem to be a matter of much importance. As stated several times, most of the present lines are now at a disadvantage in handling their growing business on account of their inability to use as heavy motive power as would seem likely to be most efficient, considering that much of the freight traffic can be moved most economically on the commodity basis (which means by heavy tonnage trains at comparatively slow speeds). One exception is the Peking-Suiyuan line, with its heavy motive power and freight equipment with power brakes, whose working results compare favorably with those of the other lines, notwithstanding the much steeper grades resulting from the rougher country through which it passes. It is therefore felt that expenditures for bridges carrying much heavier loads than the present ones and for lines with reasonably low grades would be entirely warranted in the building of future railways.

Japan has given careful study to the characteristics of the lines to be built. No doubt its action will be entirely controlled by the funds available, but it can be taken for granted that such action will conform to the methods and principles that the Japanese consider most advantageous for themselves; it will in no way be affected by the results of the conflicting advice of foreign railway experts, as has occurred in China.

ROADWAY AND EQUIPMENT STANDARDS.

Japan has the matter of standards thoroughly in hand, and any American manufacturer in doubt as to what is required can obtain full explanation from the inspecting engineer's office, in New York, of the Imperial Government Railways of Japan.

The Chinese Government Railways, however, are very far from attaining this fortunate position. Each of the several railways can be considered as having in many ways the standards of the nationality of its particular loan, and in many respects these are quite different—for example, the frogs and switches used on the different lines. The system of uniform accounts is an excellent illustration of what might be accomplished in standardizing all the practices of the Chinese Government Railways as to roadway and track, motive power, and rolling stock of all classes. Certain essentials could be fixed—and alternatives allowed in other respects—that would enable these lines to secure broadly the benefit of international markets, particularly as regards the price competition that would thus ensue. No doubt direct benefit would result to the Chinese railways if, in the adoption of such standards, special consideration were given to the devices that can now or may in the future be manufactured in China at such places as the Tangshan shops.

As an example, one may mention 33-inch chilled cast-iron car wheels similar to those now being manufactured at the Shakako shops and used as standard on the freight equipment of the South Manchuria Railway, where the conditions and traffic are probably fully representative of the future developments on the Chinese Government Railways as a whole. If wheels of this diameter and material are satisfactory for the service of the South Manchuria Railway (as they apparently are), it would appear that this should be permissible practice to meet the requirements of the Chinese Government Railways, in view of the fact that this is the type of wheels that could be manufactured to best advantage in China at such points as the Tongshan shops on account of the Chinese workman's adaptability for handling this class of work.

FINANCING EXTENSIONS AND BETTERMENTS.

It is felt that the foregoing data warrant a repetition of the statement that one of the big problems in Chinese railway development is the providing of funds for extensions, betterments, and additional terminal facilities and equipment as the business of the roads grows. These remarks apply even to the profitable lines, especially where a considerable part of the original construction funds is amortized in the first 25 or 30 years. Full provision for these requirements of the Chinese Government Railways appears to the writer to be one of the problems of the consolidation suggested.

There seems to be little occasion to comment on this situation in connection with Japanese railways. The Japanese Government can doubtless secure such funds, to a reasonable amount, as it elects to expend on the Government lines, and the funds for the construction of the subsidized private light railways and tramways will be forthcoming from private investors or the interested municipalities.

BUYING ADDITIONAL EQUIPMENT.

In view of the small amount of rolling stock that the Chinese Government Railways now have for the handling of their traffic and the immediate need of additional equipment to take care of their growing business, it appears to the writer that there exists an excellent opportunity for American interests to furnish a considerable quantity of rolling stock, to be financed through the medium of equipment trust certificates, along the same general lines that have been followed in connection with the American railways for many years. The writer discussed the possibilities of such an arrangement with representatives of the Ministry of Communications and the officials of some of the lines that need additional equipment, and in each instance they were very receptive to the suggestion. The need of such additional equipment is shown by the table on page 76.

KIND AND AMOUNT OF EQUIPMENT NEEDED.

At the risk of repetition, it is felt that the situation warrants the statement that additional freight equipment in general should be of large hauling and carrying capacity, that it should be provided with power brakes, and that there should be a continuance of the use of automatic couplers constructed with robust draft rigging for the

handling of heavy tonnage trains over moderately long distances. It is not probable that the hauls in China will equal those in America, but in all probability the average future haul in China will considerably exceed the average in most other countries and much of the business will be done on a commodity basis.

It is quite impossible to state the amount of equipment that will be needed, but, with the car efficiency now obtained, it seems reasonable to assume that the Chinese railways will not need an amount of equipment equal to that needed in the United States. However, as the haul becomes longer (as it has been steadily doing) and as the business grows it is hardly likely that the present car efficiency will be maintained. Therefore, it is probable that a very considerable amount of additional rolling stock—especially freight cars and locomotives—will be required, but that this will not be equal to that on American railways handling an equal amount of business. One element that has helped the Chinese lines and probably will continue to do so is the supply of labor available in all parts of China, which makes it cheaper to unload cars and store the materials than to pay the present high car-demurrage rates.

The actual carrying capacity of the freight cars on the six Chinese Government Railways shown by the table on page 76 is 79 tons (of 2,000 pounds) per mile of line, while the average carrying capacity on the American railways is 404 tons per mile of line; that is, the American railways have more than five times as much freight-carrying equipment as the Chinese Government Railways.

No comments are made in this connection regarding the Japanese railways, since they are steadily adding to the equipment of all their lines, including the South Manchuria and Korean railways. In Manchuria and Chosen, however, this equipment is along the lines above suggested for the Chinese Government Railways. In Japan proper it can be generally described as the goods-wagon type of equipment, as illustrated in figure 38.

WORK EQUIPMENT NEEDED.

The term "work equipment" is used as applying to construction plant and maintenance and wrecking equipment. The lines in both Japan and China have very little of this class of equipment, as one sees it in America. The principal reason has been the large supply of cheap labor always available for handling work. It has been considered cheaper to do all work by hand than to employ expediting and labor-saving machinery; and, in addition, the time element has not heretofore been considered sufficiently vital to offset the cost of the expediting plant. During the past, in the Far East, time, after cheap labor, has been the most abundant commodity; therefore a few days, weeks, months, or years more in the construction of the project was not of the same moment as the direct cost. Modern methods, however, are being given greater consideration, and expediting machinery, which is also labor saving, is beginning to come into use in many ways. There will be a growing use of this class of equipment on the railways in both Japan and China. The recent expansion of all kinds of industry in Japan has produced a shortage of labor in many connections, particularly on the railways, where lower wages are paid than in almost any other industry.

A typical example of the employment of construction plant equipment is the use of 10 or 15 large steam-road rollers on the street-improvement work in the city of Peking. Their use was due not so much to the low unit price of the work as to the expedition and quality resulting. They were used in spite of the large amount of cheap labor in this section of China. The growing interest charges on some of the large undertakings will no doubt have much to do with the use of construction machinery. An excellent illustration of this is a large reinforced concrete office building being constructed in Tokyo by hand methods; it is taking three times as long to erect this structure as would have been the case with a well-arranged construction plant. This means that the construction interest-carrying charges were probably more than doubled and that the income was lost for this period—more than offsetting any possible saving by reason of the cheap labor. This point is being recognized by the Japanese engineers, and it is also well known to the foreign and Chinese engineers in China.

WHARF AND HARBOR EQUIPMENT.

The foregoing remarks apply to the handling of cargo. At present it is surprising how expeditiously the work is done at some points, particularly the taking of bunker coal at Nagasaki and the handling of cargo coal at Dairen and Chinwangtao. Recently, however, the labor shortage has been serious at times at Nagasaki. In the course of time with increased shipments the consideration of quantity handled, rather than of cheapness, will probably be of primary importance in such situations as those at Dairen and Chinwangtao and in connection with the handling of iron ore at Hwangchow and of fuel and ores at the Han-Yeh-Ping iron and steel plant. At the last-mentioned place there is already in course of construction an unloading outfit for the handling of ore and fuel from the barges in which they are transported from the mines.

SHOP MACHINERY AND TOOLS.

The Japanese railways have given this subject careful study, and their shops, as a rule, are equipped with well-selected machines and tools, a large percentage of which are from American sources, although much equipment is also of British and German manufacture and a growing percentage is of Japanese manufacture. The Japanese are very alert and are increasingly appreciative of the benefit of the best equipment along these lines. They will doubtless keep close watch on American developments, and, in all probability, this will continue to be one of our best fields in the Japanese railway markets, particularly on account of the special adaptability of many American products. American machinery and tool manufacturers are, as a rule, well represented in Japan either by American concerns or by the strong Japanese commercial and engineering companies already referred to several times. The writer had noticed the extensive use of certain tools in Japan, and, in a conversation with a representative of one of the American manufacturers, the latter expressed wonder as to what the Japanese did with all the tools they were buying, in view of the large supply of cheap labor that he understood to be available. Upon an explanation of the factors of expedition and quan-

tity of product required, he stated that he had not appreciated those points.

Outside of the South Manchuria Railway shops at Shakako and to a certain extent the Tangshan and Harbin workshops, the railways in China are rather inadequately equipped with expediting and labor-saving machinery and tools. Much of the present equipment is of American manufacture, even on the lines built with British, French, and Belgian loans, but in the German-built shops nothing but German machinery has been used.

With the limited equipment and the pressure of growing business the present slow hand methods of doing much of the work have proved unsatisfactory—not from the standpoint of cheapness but because they keep equipment out of service when it is badly needed. A typical case of this is the boiler repairs to the large locomotives in use on the Peking-Suiyuan Railway, which are held out of service almost twice as long by reason of the hand work as they would be if the repairs were effected with a full complement of compressed-air working tools. Therefore, notwithstanding the cheap and capable labor, there should be, and probably will be, a growing demand for shop tools in the Chinese Government Railway workshops.

ELECTRIFIED LIGHT RAILWAYS AND SHORT-LINE TRAMWAYS.

The data shown regarding the electric tramways in Japan and the profits resulting from the Hongkong, Shanghai, and Tientsin electric tramways seem to the writer to warrant the statement that electrified light railways (or what are called interurban railways in America) will be highly profitable in China if operated and managed with ability. In many instances there would be a combination of city and interurban lines. The writer also believes that if such lines as the Sunning Railway, the Canton-Samshui line, the Swatow-Chaochow Railway, the Changchow-Amoy line, and the Kiangsi Railway, instead of being operated as steam railways, were electrified and would do an interurban business, they would show much better working results. This is particularly true of the last three, which are now showing losses instead of profits; but, in view of their small amount of freight business, it is also very probable that the first two lines would show better results.

Railway construction in the congested districts of China will be expensive in any event, but the light electrified lines would be considerably easier to locate, and this would, in a measure, offset the increased cost of electrification. A plan according to which the trunk lines and branches handling freight would be built as steam railways and the short-travel passenger railways and the light railways as electric lines has much to commend it as one of the arrangements to be adopted in a program of railway construction for China as a whole, especially in view of the available data showing that electrified light railways would probably be more profitable than steam-operated light railways.

ORGANIZATION AND METHODS OF OPERATION.

While the distinctly departmental organization and the strictly station-master method of operation may impress representatives

of American concerns doing business with the Chinese and Japanese railways as not being the best arrangement, it is the writer's opinion that the conditions are such that both these situations must be accepted. Business should be done with these railways along these lines, particularly when it is a question of specifications or equipment (though this will seldom be the case outside of such matters as those involving signaling and train dispatching). It may be true that by these methods the Far Eastern lines do not move traffic with the same speed as the American roads, but to do so they would be obliged to take a greater amount of risk on account of the class of men with which they have to operate these railways.

FOREIGN EXPERTS IN CHINESE RAILWAY SERVICE.

If the scheme of consolidation previously suggested were to be effected, there is no doubt that this should be done under experienced foreign direction, possibly similar to the present administration of the Salt Gabelle or the Chinese Maritime Customs. Such a necessity would probably be recognized by the most advanced of the Chinese railway men. As illustrating this, the view of Dr. C. C. Wang, the present head of the Peking-Hankow Railway, as expressed in the Chinese Social and Political Review and reprinted in the December, 1917, issue of the Far Eastern Review, is quoted as follows:

Experience has shown everywhere that railways must be managed by experts. The problems of railway administration are so numerous, the effects so far-reaching, the organization and working so complex, that it is only experts that may be able to develop the railways properly. It may be generally said that one of the greatest needs of the railways in China is expert service. A few facts may help to show the needs.

We all know that in dealing with foreigners we have lost in many cases in the matter of railways. This perhaps was not due so much to the aggression of our foreign friends as it was to the fact that they were experts while we were not. They knew what they talked about, but we sometimes did not. When our layman representatives, who had no intimate knowledge, met the foreign experts who knew every corner of the question, it might have been expected that our men lost out.

It is due to the same lack of experts in China that we have to employ many foreigners in our railway service at a great cost. The fact that we have had considerable trouble in dealing with some of our foreign employees may be traced to the same cause. To ameliorate the situation we must first of all train up our own experts. Otherwise, any attempt to relieve our foreign assistants will be suicidal. In fact, we need more real foreign experts selected by ourselves for special work, who should be willing to work disinterestedly for the country and ready to afford our young men every opportunity to learn. By this process in a few years we shall have our own experts. But the fundamental requirement for training up our own experts under our foreign employees or under any other system is that there must first of all be adopted an impartial and effective system for selecting the young men to begin with, a fair protection against the influence of the politicians and cliques, and a stable and well-defined service that will permit the men to work long enough to learn the business.

Substantially this same view is expressed by some of the other most progressive Chinese railway officials. For the present foreign experts in the capacity outlined by Dr. Wang are necessary in the further development of the Chinese railways.

At present there are no foreign experts in the employ of the Japanese railways. The Japanese will probably continue their present practice of making such investigation and study of other railway methods and equipment as they think necessary, and then applying their conclusions in their own way.

ROLLING-STOCK SPECIFICATIONS.

The matter of rolling-stock specifications is considered at some length, beginning on page 77. In this place it is only necessary to say that, with the conditions now prevailing and until such time as the Ministry of Communications adopts definite specifications, it is quite proper (and, in fact, advisable) for American manufacturers to put forward propositions conforming in general to American specifications for equipment to be furnished to the Chinese Government railways; advantage should be taken of such points as type of engine frame, but such nonessentials as type of boiler and fire-box materials can be conceded. This suggestion is made for the reason that, in the writer's opinion, the best interests of the Chinese Government Railways will be served by the use of rolling stock along the lines of American practice. Inquiries from Japan will no doubt give very definite and detailed specifications as to what is wanted.

CONTRACTING AND CONSTRUCTION PLANT.

General contracting so far, in the construction of Chinese railways, has been largely an arrangement taken care of by the railway loan agreements. The construction corporation of the loan syndicate, as a rule, has bought the necessary materials and equipment and in general handled the construction work—usually with a small amount of construction plant. In many instances the work has been sublet to Chinese contractors (generally local parties) and the work divided into small amounts; also, it is usually separated as between grading, foundation and culvert work, and station buildings. It is probable that much of the work in the future will be so constructed. There are certain lines projected, however, some parts of which will pass through somewhat sparsely settled, rough country, and the reduction of the time element would appear to warrant the statement that certain expediting construction plant probably will be used in the future.

If the gauge of the Imperial Government Railways of Japan is widened to 4 feet 8½ inches along the lines of a general reconstruction, there will be need of very much more construction plant than has previously been used, and the execution of the work in the reduced time now estimated would require some intensive construction plant along the lines of American practice.

BRIDGE AND BUILDING MATERIALS.

Bridge materials for the Chinese Government Railways thus far have been largely furnished by the loan interests or from the Shan-haikwan bridge works of the Peking-Mukden Railway. In general, the specifications have conformed to the practice of the nation responsible for the loan. For recent construction and replacement, however, a good many bridges have been obtained from American sources. This is particularly the case with the new work on the Canton-Hankow line and the replacement on the Peking-Hankow line of bridges lost in 1917.

Chinese and Japanese materials have ordinarily been used for substructures and station building in both countries. There are numbers of cement plants in both China and Japan. Brick and tile

are made in considerable quantities in many localities. The result is that little material is required from the outside, except where reinforced concrete is used; this is being employed to an increasing extent, but up to the present time the work has usually been done by hand, except for the mixing machines, which are considerably used.

COAL AND WATER STATIONS.

The storage of both coal and water is along the very simplest lines in both China and Japan. Very little labor-saving or expediting equipment is used. In locomotive coaling and taking water the locomotives are always uncoupled from the trains. Very little water treatment apparatus has been installed thus far, but as a rule the water is "fair to good" for locomotive use in both countries. In China and Manchuria a good deal of the water carries considerable material in suspension, which can be removed by filtration.

COMMODITY HANDLING PLANTS.

Coal and all other similar commodities being so largely handled by hand, there is very little plant for handling or storing by mechanical methods. This also applies to the handling of agricultural products, most of which are handled in boxes or packages made from matting. Rice is generally handled in what may be termed matting packages. The Japanese authorities have given a good deal of study to the handling of soya beans in Manchuria by elevators, but so far no installations have been made, though, with the advantages of drying and cleaning, it appears that this could be done with considerable benefit. The same remarks apply to the handling of both beans and wheat at Vladivostok and Harbin.

RAIL AND FASTENINGS.

Normally the Japanese railways are supposed to obtain their supply of rail and fastenings from the Imperial Japanese Steel Works and the Chinese railways from the Han-Yeh-Ping Steel Works, but, because of the demand for the products of these plants, considerable quantities of rail and fastenings have been obtained from other sources. Japanese railways recently obtained a considerable quantity of rail from the steel mills in Colorado. The Chinese standard 85-pound rail section and details of fastenings are shown on page 75. There is a decided opportunity for the use of rail anchors (anti-creepers) on many of the Chinese railways. All rail anchors used thus far in both countries have been largely from American sources, although in Japan the practice is quite extensive of using second-hand ties set on end to anchor the track.

CROSSTIES AND TIMBER.

One of the great problems of railway construction and maintenance in China will be the supply of suitable crossties. The table on page 73 shows the life of most timbers to be comparatively short and the cost high. In the writer's opinion, a special steel or other similar type of crosstie will provide the solution of this difficulty. One of the conditions that will assist in the success of special track construction

in China is the large supply of the cheap and capable labor required for such construction and maintenance, particularly when heavy traffic is handled.

The supply of timber in China is small and the price very high, and the present growing practice of using reinforced concrete for station curbing, information signs, fence posts, and many similar requirements will no doubt be further extended on all the lines.

FENCING MATERIALS.

Under ordinary conditions, particularly in the agricultural areas, fencing is an impracticable luxury in China, but in urban districts considerable structures, rather than fences, are at times built along the railways, and the practice is rather to thus inclose the railways in the cities and towns than to fence them through the country. In some cases American fencing materials have been used, and their use could be extended to much advantage, especially materials for very robust fence posts and also special spiral wire for the country fencing, a little of this latter having been used heretofore.

FROGS AND SWITCHES.

While the frogs and switches have conformed in the main to the practice of the builders, the tendency for new work and maintenance is to use material along the general line of practice that is becoming common in both China and Japan, representing what might be termed a compromise between British and American practice. Thus far only a few special hardened parts have been used, but the growing traffic on both the Chinese and Japanese railways will warrant the extensive use of such material, for which their track work is well adapted.

A very miscellaneous assortment of derails is used in both countries; most of these are homemade devices or manufactured in the railway's own workshops. A good example is shown in figure 21. The American type of derails could be used in both countries to advantage. A good many derails are used, and there seems to be a growing tendency to provide additional protection in this connection.

ROADWAY AND TRACK TOOLS.

A study of the roadway and track tools in use on the railways in China would constitute something of an education on this subject. Nearly everything that the writer ever heard of was to be found in use in one place or another. With the similarity of conditions on a large percentage of the lines and with the stone ballast, American tools are, in general, well adapted for construction and maintenance work on the Chinese railways. They are also suited to the railways in Japan. A good many American roadway and track tools are used in both countries, though there is a decided tendency for the Japanese now to manufacture their own tools.

SIGNALS AND TELEPHONES.

With the small amount of really modern signals and central train-control apparatus now installed, there is every reason why the

simpler three-speed American method of signaling and selective telephones to direct present train working should be adopted in both Japan and China. This could be done with benefit, particularly to take care of the growing traffic, which will necessitate increasing the traffic capacity of these railways from time to time.

OILS AND STORAGE.

Burning oils and lubricants in China are largely from American sources. In Japan much of the higher-grade lubricating material is of American manufacture, but a considerable amount of the lubricants, especially the cheaper materials, are from Japanese sources. This condition also obtains in South Manchuria and Chosen.

There is a variety of arrangements for storing and distributing the oils, but in only a few cases are the best modern methods employed. As all oils are expensive in China, improved apparatus could be adopted in many instances so as to show a good return on the investment.

BUSINESS METHODS.

Much might be said regarding the best ways of conducting business in China and Japan, particularly regarding the much-discussed Chinese "comprador" method. The conclusion was reached, however, that this method has little, if any, effect on the business of handling railway equipment.

The writer is strongly of the opinion that experienced application and commercial engineers are necessary for the most successful handling of railway business in China and Japan, as is the case in handling these markets in all parts of the world. There have been and will be special conditions to be met and problems to be solved in both of these countries, and, without question, the obtaining of business can best be followed up by experienced engineers on the ground who will be able to make the best application of available apparatus.

REPRESENTATION.

The question of representation is admittedly one of much importance. In Japan, at present, there are a number of well-organized American concerns representing American manufacturers; most of these have Japanese employees who are technically familiar with the products handled. The several strong Japanese commercial and engineering companies usually represent a number of American manufacturers for the sale of railway materials, and as a rule these concerns have a well-organized technical staff. In addition there are a number of large American manufacturers who have established branch plants in Japan. Much has been said concerning the advantages of these different arrangements, and, on the other hand, there has been considerable criticism of each of the last two methods as not being, in the long run, to the best American interest. The writer inclines to the opinion that it is quite desirable, in any event, for American interests to retain control of the business in some form, and the first of the above arrangements has much to commend it, especially in view of the fact that there are at present a number of well equipped American concerns for handling the business.

In China, aside from the Han-Yeh-Ping Co. and the railways' own workshops, there are very few strictly Chinese concerns handling railway business. There is, however, a considerable variety of commercial concerns in China representing American manufacturers of railway materials. Some of these are of strictly American interests, but few are fully staffed with Americans, although several are approximately so, especially as regards the technical staff. Some of the other concerns are mixed as to interest, nationality of concerns represented, and nationality of staffs (particularly the technical staffs). It is felt by the writer that American interests and also the customer's interests would be best served through the representation of American manufacturers by American or American-Chinese concerns. Such interests will give the best consideration to the permanent maintenance of the business, while the houses of other nationality will be chiefly interested in the immediate business and the profit therefrom and will desire to secure later business for their own nationalities. This statement is especially pertinent in connection with the recent war conditions.

The question has been asked whether there are sufficient American concerns of this character to handle the present and future business.

The writer believes that there are; in fact, he is strongly of the opinion that some of the present concerns should make a working arrangement under the provisions of the Webb-Pomerene law (making it possible for American interests to combine in handling foreign business), especially to eliminate some of the unwarranted competition between American interests and to represent fully the best American products. Another desirable result that such a consolidation would tend to insure is the utilization of the most experienced men, particularly those who have been in China and have become acquainted with conditions. Probably more than in other countries, experience is an asset in handling business in China. Application engineers should be engaged for long periods—at least 5 years and preferably 10 years. As a matter of fact, this is the rule with the engineers of other nationalities. Also, to handle these markets to the best advantage, it is very necessary that such engineers should return to America for periodical visits to keep fully up to date with developments. Another advantage of such an arrangement would be the utilization of high-grade men to handle extensive lines of railway materials, equipment, and supplies. This will be particularly desirable when competition is encountered, as it will be after the war.

In the writer's opinion, the railway markets of China are going to develop along such lines—in fact, conditions are such now—that one experienced, energetic representative can handle a very considerable number of similar lines; and he can do this at the various commercial centers if aided by the staffs of the several local offices. This is especially true where these local offices have well-qualified engineers (as they frequently have). These remarks apply particularly to the concerns that have their principal or head office in one of the large trading centers—usually Shanghai but sometimes Tientsin—and branches in the other centers, such as Peking, Hankow, and Canton or Hongkong, these centers being the most important from the standpoint of railway markets.

An additional reason for American manufacturers to combine for handling the sale of railway equipment and materials to the Chinese

Government Railways is the growing tendency for the Ministry of Communications to supervise large purchases. Manufacturers in the United States do not yet appreciate as they will later the difference between selling railway equipment and material to a centralized buying organization and the competitive buying of a large number of private railways. This is also a strong argument for having seasoned application engineers available to handle this business, particularly in view of the weight that such men's opinion carries with the Chinese officials. It goes without saying that an acquaintance with the personalities of the officials and a knowledge of the formalities of procedure are valuable assets in this connection; and they both take time to acquire.

The most advantageous point at which such representatives may be located is rather difficult to state, particularly as most American concerns have their principal or head offices in Shanghai. Peking is likely to become, in the course of time, the most important place, because of its being the headquarters of the Ministry of Communications and of the Peking-Hankow and Peking-Suiyuan lines, as well as the point from which one can best keep in close touch with the Cheng-Tai, Tao-Ching, and Pienlo lines, whose operating headquarters are at points on the Peking-Hankow line. Tientsin, the headquarters of the Peking-Mukden and Tientsin-Pukow lines and also of the Kailan Mining Administration, is only 87 miles by rail from Peking. Many of the American manufacturers have fully equipped branches in Tientsin, some of which handle the Peking business. The round trip between Peking and Tientsin can be made in a day, the traveler having from 10 a. m. to 4.45 p. m. at either end.

Hankow is headquarters for the Hukuang Railways and, on account of the construction of these lines, will be an important point to be kept in mind. Canton (or Hongkong as an alternative location), on account of the existing lines and lines that probably will be constructed, will be a point of some considerable importance for the handling of Chinese railway markets in southern China; from this point the French Indo-China railways can be reached.

Shanghai, while the most important commercial center in China, is the headquarters only for the Shanghai-Nanking and Shanghai-Hangchow-Ningpo lines, both under British foreign staffs. It is probable, however, if sufficient traveling is done, that Shanghai is the location from which the situation can best be handled as a whole—at least for the present. From whatever point it is undertaken to handle the business, a very considerable amount of traveling will be required to obtain all the business possible.

CHINESE STUDENTS IN UNITED STATES.

Many persons probably do not appreciate the number of Chinese students that are being given technical education in America through the working of the American refund of the Boxer indemnity. Numbers of these students are remaining and taking a limited apprenticeship course in various railway equipment plants. Some of the present Chinese Government Railway officials, particularly in the mechanical department, have followed this course. Without doubt it has been of much benefit to these men, but, in the writer's opinion, the maximum results were not obtained for the reason that the men were

trained mostly in designing and manufacturing methods of the very large concerns, while, when they return to China, they are more concerned with the daily routine of keeping things running. These men would have received much more benefit had the same time been spent in the railway roundhouse or back shops in the making of all kinds of repairs.

DISTRIBUTION OF CATALOGUES.

In China and Japan there are no restrictions as to the distribution of catalogues, handbooks, and similar publications. Where the recipients can read English (as they can do in many instances in both countries) there is no doubt of the value of such distribution.

TECHNICAL AND OTHER USEFUL PUBLICATIONS.

The Far Eastern Review, first published in Manila but now published in Shanghai, has been the principal engineering paper for some years. Another technical publication in connection with railway markets that is printed in English is the Eastern Engineer (British), published at Shanghai and Hongkong. A new publication known as the Trans-Pacific is devoted to financing and engineering; this will be published in Tokyo in connection with the Japan Advertiser, a daily paper printed in English and owned by American interests.

One of the most useful publications is known as "Who's Who of American (Chinese) Returned Students." This gives in both Chinese and English texts a concise statement concerning all such students. It is particularly useful as a means of obtaining information regarding the various Chinese railway officials who were educated in the United States, before calling on or meeting them. The price of this book is \$1 Mex. It is published by the Tsing Hua College, Peking, China, and is revised annually.

The Imperial Government Railways of Japan publish in five volumes an Official Guide to Eastern Asia. This is very useful, particularly the maps of the most important cities, which are both clear and accurate. The five volumes are as follows: (1) Manchuria and Chosen; (2) Southwestern Japan; (3) Northeastern Japan; (4) China; (5) East Indies (including the Philippine Islands).

Dr. M. T. Z. Tyau's "Treaty Relations Between China and Other States" is very good for answering many questions that arise as to the peculiar conditions in China.

For a commercial, industrial, and residential directory, the writer depended in general on Rosenstock's Directory of China and Manila. This is published annually at No. 4 Canton Road, Shanghai. Copies are on file at the several district offices of the Bureau of Foreign and Domestic Commerce. The agents in America are the Thomas Publishing Co. of New York, and Frank Shipley, of Seattle.

Appendix 1.—DIRECTORIES.

Following are directories of the principal officials of the railways covered in this report, so far as it was practicable to obtain such information in the limited time at the writer's disposal. The directories are arranged in the order of the text, except that for the Korean Railway, which is shown as a section of the South Manchuria Railway. The writer found the task of obtaining anything like a complete list of all the officials exceedingly difficult—in fact, an almost impossible undertaking—particularly on some of the lines where the duties of the foreign and Chinese staffs are not clearly defined. It was also made difficult by reason of the many changes in the railway officials, especially the higher Chinese officials.

In the following lists, Chinese officials educated in the United States are indicated by an asterisk (*).

CHINESE GOVERNMENT RAILWAYS: MINISTRY OF COMMUNICATIONS.

Head office: Peking, China.

Minister	Tsao Ju-lin, Peking.
Vice minister.....	Yih Kung-cho, Peking.
Councilor.....	Chiang Tsun-wei, Peking.
Do.....	Yao Kuo-Chen, Peking.
Director of the Railway Department.....	Kwan Kang-lin, Peking.
English secretary.....	P. M. Whang, *Peking.

NOTE.—Mr. Whang was a student at Michigan Mining College from 1903 to 1912 and at Columbia University from 1913 to 1914.

PEKING-MUKDEN (CHING-FENG) RAILWAY.

Head office: Hopei, Tientsin. Cable address: Kinfeng.

Managing director.....Chu Kin How (Hsu Ting-Chuck*), Tientsin.

General:

General manager and engineer in chief....	D. P. Ricketts, Tientsin.
Secretary.....	H. W. J. Marshall, Tientsin.
Stores superintendent.....	W. K. Bradgate, Hsinho.

Traffic:

Traffic manager.....	J. E. Foley, Tientsin.
Deputy traffic manager.....	W. H. Steel, Tientsin.

Engineering:

Chief assistant engineer.....	E. H. Rigby, Tientsin.
Senior district engineer.....	L. J. Newmarch, Shanhaikwan.
Manager bridge works.....	W. G. Howard, Shanhaikwan.
Mining engineer.....	W. A. Moller, Chuliuho.
District engineer.....	J. C. Martin, Tongku.
Resident engineer.....	W. O. Leitch, Kaopantzu.
Do.....	W. M. Bergin, Lanchow.
Assistant engineer.....	H. Farrant, Fengtai.
Do.....	A. M. Tatham, Tongshan.
Do.....	H. Stringer, Yingkow.
Do.....	L. H. Barnes, Shanhaikwan.

Locomotive:

Locomotive and works superintendent....	F. A. Jamieson, Tongshan.
Assistant locomotive superintendent.....	J. C. Anderson, Kaopantzu.
Works manager.....	Stewart Fripp, Tongshan.

Accounts:
 Chief accountant.....William Henderson, Tientsin.
 Locomotive accountant.....F. A. Harris, Tongshan.
 London agents: J. Whittall & Co. (Ltd.), 9 Fenchurch Avenue, London, E. C.
 Consulting engineer for rails, wheels, axles, springs, and bridges: C. P. Sandberg,
 Princes Mansions, 70 Victoria Street, Westminster, London, S. W. 1.

PEKING-SUIYUAN (KIN-SUD) RAILWAY.

Head office: Peking. Cable address: Kalganry.
 Managing director.....Maj. Gen. W. S. Y. Tingo, Peking.
 Associate managing director.....J. C. Ho, Peking.
 Stores:
 Superintendent.....Wong Shih-tien, Nankow.
 Traffic:
 Traffic manager and telegraph superin-
 tendent.....C. T. Shar, Peking.
 Traffic inspector.....Fong Yu shu, Hsichihmen.
 Do.....Lin Pao Chieh, Kalgan.
 Do.....P. Y. Shar, Kangchwang.
 Do.....C. C. Woo, Tatungfu.
 Transporting office:
 Secretary.....C. Y. Wen, Hopei, Tientsin.
 Engineering:
 Engineer in chief.....Chen Hsih-lin, Kalgan.
 District engineer.....Chai Chao-lin, Nankow.
 Resident engineer.....Tsai Tsun-chou, Tatungfu.
 Assistant engineer.....Liu Chee, Kalgan.
 Do.....Li Keh-sui, Nankow.
 Do.....S. C. Shao, Fengchen.
 Locomotive:
 Deputy locomotive superintendent.....S. T. Wang* (M. E.), Nankow.
 Deputy superintendent workshop.....P. Wang* (M. E.), Nankow.
 Do.....C. F. Hou* (M. E.), Kalgan.
 Accounts:
 Chief accountant.....H. C. Lee, Peking.
 Assistant accountant.....Ip Tai-wan, Peking.

TIENTSIN-PUKOW RAILWAY.

Head office: Hopei, Tientsin. Cable address: Tsinpury.
 Managing director.....S. C. Shu, Tientsin.
 Assistant managing director.....S. W. Lao, Tientsin.
 General:
 Superintendent.....Cheng Hang, Tientsin.
 Foreign secretary.....L. S. Tang, Tientsin.
 Secretary and chief storekeeper.....Kwan Paulun, Tientsin.
 Traffic:
 Traffic manager.....S. T. Chow, Tientsin.
 Locomotive:
 Chief, locomotive and workshops.....Tsai Kuo-Tsao, Tientsin.
 Accounts:
 Chief accountant and auditor.....Kuang Y. Pao, Tientsin.

TSINHAN (NORTHERN) DISTRICT.

General:
 Superintendent.....Chien Shuh-Chao, Tsinanfu.
 Depot storekeeper.....Pang Hoo Chuan, Tsinanfu.
 Traffic:
 Chief traffic inspector.....E. C. Liu, Tsangchow.
 Do.....C. Y. Feng, Tsinanfu.
 Engineering:
 District engineer in chief.....K. Y. Kwong* (C. E.), Tientsin.
 District engineer.....H. T. Chao, Tientsin.
 Do.....Hu Scheng-Hung, Tsinanfu.
 Do.....Y. S. Ye, Tenghsien.

Locomotive:
 Workshop superintendent.....Konway M. P. Tsing, Tsinanfu.
 Boiler inspector.....A. G. Martyn, Tsinanfu.
 Accounts:
 District chief accountant.....Kuang Y. Pao, Tientsin.
 Accountant.....T. Y. Chao, Tientsin.

HANPU (SOUTHERN) DISTRICT.

General:
 Superintendent.....Ho Ping-Lin, Pukow.
 Depot storekeeper.....S. K. Lee, Pukow.
 Traffic:
 Chief traffic inspector.....W. C. Dodds, Pukow.
 Engineering:
 District engineer in chief.....T. W. T. Tuckey, Pukow.
 District engineer.....A. R. J. Hearne, Pukow.
 Assistant engineer.....E. Connell, Pukow.
 Do.....R. T. Walters, Pukow.
 Do.....O. Karlbeck, Pengpu.
 Do.....R. B. Aries, Hsuehchowfu.
 Locomotive:
 Locomotive and workshop superintendent.....J. Alston, Puchen.
 Workshop foreman.....W. J. Black, Puchen.
 Boiler inspector.....C. R. Butler, Puchen.
 Accounts:
 District chief accountant.....J. O. B. Power, Tientsin.
 Accountant.....G. P. Douglass, Tientsin.

CHENG-TAI (SHANSI) RAILWAY.

Head office: Shihchiachuang, Chihli. This line is given as the Tcheng Tai in the Universal Directory of China, showing head office located at Cheukiatchonang, another rendering of Shihchiachuang.

Managing director.....Ting Ping Lan, Shihchiachuang.
 General staff:
 Consulting engineer.....Hsu, Shihchiachuang.
 Engineer in chief.....M. M. Jacquit, Shihchiachuang.
 Assistant engineer in chief.....M. de Lapeyviere, Shihchiachuang.
 Traffic engineer.....M. M. Baines, Shihchiachuang.
 Locomotive engineer.....M. Alabergere, Shihchiachuang.

PEKING-HANKOW RAILWAY.

Head office: Legation Glacis, Peking. Cable address: Kinhan.
 Managing director.....Dr. C. C. Wang* (C. E. and Ph. D.),
 Peking.
 Assistant managing director.....C. S. Shui, Peking.
 General adviser.....G. Bouillard, Peking.
 Technical secretary.....O. Bievelz, Peking.
 General:
 Head stores bureau.....Lim Hsueh-Ying, Peking.
 Head business bureau.....Fei Hsing-Jen, Peking.
 Head interpretation bureau.....Chin Kuo-Pao, Peking.
 Traffic:
 Head traffic bureau.....Chien Yung, Peking.
 Chief traffic inspector.....de Rotrou, Peking.
 Traffic secretary.....Coviaux, Peking.
 Engineering:
 Head engineer bureau.....Shen Cheng-Tsun, Peking.
 Chief engineer maintenance department.....Dethieu, Peking.
 Secretary maintenance department.....Preau, Peking.

SHANGHAI-HANGCHOW-NINGPO (HU-HANG-YUNG) RAILWAY.

Head office: Shanghai.
 Acting managing director.....C. P. Yin* (A. B.), Shanghai.
 General secretary (Chinese).....Chung-Yu-ling, Shanghai.

General secretary (English).....	T. C. Chu* (M. B. A.), Shanghai.
Chief English secretary.....	P. H. Lo* (B. A.), Shanghai.
Chief Chinese secretary.....	O. K. May, Shanghai.
Chief auditor.....	T. T. Linn, Shanghai.
Engineering:	
Engineer in chief.....	A. C. Clear (M. I. C. E.), Shanghai.
Assistant to engineer in chief.....	D. P. Griffiths (M. I. C. E.), Shanghai.
Construction engineer.....	E. F. Forestier (A. M. I. C. E.), Shanghai.
District engineer.....	J. C. Molony, Hangchow.
Do.....	T. C. Pu* (B. S.), Ningpo.
Traffic:	
Acting traffic manager.....	C. L. B. Wayne, Shanghai.
Assistant traffic manager.....	S. K. Shen, Shanghai.
Locomotive:	
Locomotive superintendent.....	G. T. Finch, Woosung.
Assistant locomotive superintendent.....	K. L. C. Sun* (M. E.), Shanghai.
Stores:	
Chief storekeeper.....	C. S. B. Mayor Cooke, Shanghai.
Assistant chief storekeeper.....	A. S. Fred Chur, Shanghai.
Accounts:	
Chief accountant.....	H. Middleton, Shanghai.
Assistant accountant.....	W. O. Lancaster, Shanghai.
Do.....	W. K. Chun, Shanghai.
Do.....	T. L. Ku* (B. A.), Shanghai.
Local joint agents in China: Jardine, Matheson & Co. (Ltd.) and the Hongkong & Shanghai Banking Corporation, both of Shanghai.	
Peking representation: The British & Chinese Corporation (Ltd.); Mr. S. F. Mayers, managing director, Peking.	
Agents in England: The British & Chinese Corporation (Ltd.), 3 Lombard Street, London, E. C.	

SHANGHAI-NANKING (HU-NING) RAILWAY.

British & Chinese Corporation (Ltd.). Head office: Shanghai. Cable address: Bobstay.

Acting managing director.....	C. P. Yin* (A. B.), Shanghai.
General secretary (Chinese).....	Chung Yu-ling, Shanghai.
General secretary (English).....	T. C. Chu* (M. B. A.), Shanghai.
Chief auditor.....	T. T. Linn, Shanghai.
General:	
General manager.....	A. C. Clear (M. I. E. E.), Shanghai.
Assistant to general manager.....	D. P. Griffith (M. I. C. E.), Shanghai.
Chief storekeeper.....	C. S. B. Mayor Cooke, Shanghai.
Traffic:	
Acting traffic manager.....	C. L. G. Wayne, Shanghai.
Assistant traffic manager (Chinese).....	I. I. Lau, Shanghai.
Engineering:	
Engineer in chief.....	A. C. Clear (M. I. C. E.), Shanghai.
Assistant to engineer in chief.....	D. P. Griffiths (M. I. C. E.), Shanghai.
Maintenance engineer.....	I. Tuxford, Shanghai North.
Assistant engineer.....	T. Yang, Shanghai North.
Do.....	J. W. C. Chun, Chinkiang.
Locomotive:	
Locomotive superintendent.....	G. T. French, Woosung.
Assistant locomotive superintendent and electrical engineer.....	W. J. Grey (A. M. I. E. E.), Woosung.
Accounts:	
Chief accountant.....	H. Middleton, Shanghai.
Assistant accountant.....	W. O. Lancaster, Shanghai.
Do.....	W. K. Chun, Shanghai.
Do.....	T. L. Ku, Shanghai.
Local joint agents in China: Jardine, Matheson & Co. (Ltd.) and the Hongkong & Shanghai Banking Corporation, both of Shanghai.	
Representative in Peking: British & Chinese Corporation (Ltd.); Mr. S. F. Mayers, managing director.	
Consulting engineers: Sir J. Wolf Barry (K. C. B.) and A. J. Barry, Dartmouth House, Queen Anne's Gate, Westminster, SW.	

KAIFENG-HONAN LINES.

Also known as the Pienlo Railways and the Lunghai Railways. Director general: Shih Chao-Tsing, Peking. Operating head office: Chengchow, Honan. Cable address: Lunghai Chengchowho.

General staff:	
Engineer in chief.....	Henri Seynat, Chengchow.
General secretary.....	Joseph Heis, Chengchow.
Technical secretary.....	Henry Metz, Chengchow.
Chief storekeeper.....	M. Villaceque, Chengchow.
Agent.....	V. Blockhuys, Shanghai.
Do.....	A. Picca, Hankow.
Do.....	E. Rousseau, Tientsin.
Western section:	
Chief of section.....	L. Casella, Honanfu.
Eastern section:	
Chief of section.....	Orphanides, Suchowfu.

HUKUANG (HAN-YUEH-CHUAN) RAILWAYS.

The Hukuang Railways comprise the Canton-Hankow (Han-Yueh) Railway, the Hankow-Szechwan (Han-Chuan) Railway, the Canton-Samshui (Kwang-Sam) Railway, and the Kwangtung (Yueh-Han) Railway Co. (Ltd.). Head office: Hankow.

DIRECTORATE GENERAL.

Director general.....	Dr. Jeme Tien-Yow* (Mem. A. S. C. E.), Hankow. ¹
Secretary and chief of general affairs.....	S. Y. Kuan, Hankow.
Secretary.....	C. H. Tsai, Hankow.
Do.....	T. T. Wu, Hankow.
Do.....	Y. S. Yang, Hankow.
Chief of construction affairs department.....	S. S. Chao, Hankow.
Chief of audit and accounts department.....	C. L. Chen, Hankow.

HUPEI-HUNAN SECTION, CANTON-HANKOW (HAN-YUEH) RAILWAY.

Head office: Wuchang, Hupeh. Cable address: Yuehanry.	
Acting managing director.....	Yen Te Ching, Wuchang.
Assistant managing director.....	T. H. Tang, Changsha.
English secretary.....	F. O. Zung, Wuchang.
General:	
Chief of general affairs.....	P. H. Kou, Wuchang.
Chief of construction affairs.....	C. M. Shon, Wuchang.
Chief of audit and accounts department.....	W. F. Y. Wong, Wuchang.
Chief of land department.....	P. S. Wong, Wuchang.
Engineering:	
Engineer in chief.....	A. G. Cox (M. I. C. E.), Wuchang.
Secretary to engineer in chief.....	C. G. Golding, Wuchang.
District engineer (section 1).....	J. H. Williams (M. I. C. E.), Wuchang.
District engineer (section 2).....	F. W. W. Valpy, Wuchang.
District engineer (section 3).....	M. R. Sinclair, Wuchang.
District engineer (Changsha Line).....	C. E. Stewart, Changsha.
Traffic:	
Superintendent of traffic department.....	K. S. Hsiao, Wuchang.
Traffic superintendent.....	C. L. Huang, Changsha.
Telegraph:	
Superintendent of telegraph department.....	P. L. Fong, Wuchang.
Locomotive:	
Chief of locomotive department.....	Donald Fraser, Wuchang.
Accounts:	
Chief accountant.....	T. G. J. Brown, Wuchang.
Assistant accountant.....	T. Y. Pearson, Changsha.
Stores:	
Chief storekeeper.....	Thomas L. Blair, Wuchang.

¹ See footnote on page 85.

HANKOW-ICHANG SECTION, HANKOW-SZECHWAN (HAN-CHUAN) RAILWAY.

Head office: Hankow.

Acting managing director.....	Dr. Jeme Tien-Yow, Hankow.
Acting engineer in chief.....	J. C. Carroll, Hankow.
Secretary.....	C. Liu, Hankow.
Senior assistant engineer.....	W. C. Hsu, Hankow.
Do.....	K. S. Wong, Hankow.
Assistant engineer.....	F. K. Sah, Hankow.
Do.....	J. G. Wong, Hankow.
Do.....	S. Y. Teng, Hankow.
Superintendent of workshop.....	K. Y. Ho, Hankow.
Chief accountant.....	T. G. J. Brown, Wuchang.
Assistant chief accountant.....	C. H. Tsai, Hankow.
Deputy of telegraph department.....	Y. K. Tau, Hankow.
Assistant chief storekeeper.....	C. Jean, Hankow.

ICHANG-KWEICHOWFU SECTION, HANKOW-SZECHWAN (HAN-CHUAN) RAILWAY.

Head office: Ichang.

Acting managing director.....	Dr. Jeme Tien-Yow, Hankow.
Assistant managing director.....	S. P. Fong, Ichang.
English secretary.....	T. Z. Koo, Ichang.
Engineer in chief.....	J. C. Carroll, Ichang.
Senior assistant engineer.....	C. P. Chang, Ichang.
Do.....	W. D. Wong, Ichang.
Chief accountant.....	T. D. J. Brown, Wuchang.
Assistant chief accountant.....	C. H. Tsai, Hankow.
Assistant chief storekeeper.....	Y. L. Tu, Ichang.

CANTON-SAMSHUI SECTION, CANTON-SAMSHUI (KWANG-SAM) RAILWAY.

Head office: Canton.

Managing director.....	C. T. Hsia, Canton.
Engineer in chief.....	R. C. Johnson (Chinese), Canton.
Traffic manager.....	T. H. Low, Canton.
Auditor.....	T. S. Yuen, Canton.

KWANGTUNG (YUEH-HAN) RAILWAY CO. (LTD.), CANTON-SHINCHOW SECTION.

Head office: Canton.

Director.....	Au Keng Hsing, Canton.
Advisory engineer.....	D. S. Williams, Canton.
Chief engineer.....	Yung Men Hon, Canton.
Traffic superintendent.....	M. T. Cheng, Canton.
Mechanical superintendent.....	Liang Woo, Canton.
Inspecting engineers in England:	C. P. Sandberg, 9 Bridge Street, Westminster, S. W.
Inspecting engineers in United States:	R. W. Hunt & Co., New York.

CHINESE PROVINCIAL RAILWAYS.**TSITSIHAR (ANGANGKI) LIGHT RAILWAY.**

Head office: Tsitsihar, Heilungkiang, Manchuria. Management under the provincial viceroy of the Province of Heilungkiang.

KIANGSI (NAN-SHAN) RAILWAY.

Head office: Kiukiang. List of officials of this line not obtained.

NANKING CITY RAILWAY.

Head office: Nanking.

Managing director.....	Wong Kien Shou, Nanking.
Traffic manager.....	Tai Hsia Min, Nanking.

CANTON-KOWLOON (CHUI-KUANG) RAILWAY.**CHINESE SECTION.**

Head office: Tai-Sha-Tau, Canton. Cable address: Kuangchui.

Managing director.....	Weu Feh Chang, Canton.
Assistant managing director.....	Liang Shi Hsu, Canton.
Secretary.....	Chau Teh Mei, Canton.
Chinese secretary.....	Yung Man Wai, Canton.
Engineering:	
Engineer in chief.....	H. T. Foord (M. I. C. E.), Canton.
District engineer.....	W. M. Stratton, Canton.
Assistant engineer.....	B. Christiansen, Sheklung.
Do.....	W. W. Leung, Canton.

Traffic:

Traffic manager.....	C. T. Liu, Canton.
Traffic inspector.....	J. F. Smith, Canton.
Do.....	S. M. Bander, Shumchun.

Locomotive:

Locomotive superintendent.....	C. E. Watson, Canton.
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Accounts:

Chief accountant.....	H. P. Harris, Canton.
Assistant accountant and auditor.....	H. S. Chow, Canton.

Stores:

Chief storekeeper.....	Chu Yan, Canton.
Local joint agents in China:	Jardine, Matheson & Co. (Ltd.) and the Hongkong & Shanghai Banking Corporation, both of Shanghai.
Agents in England:	The British & Chinese Corporation, 3 Lombard Street, London, E. C.
The British & Chinese Corporation representative in Peking:	S. F. Mayer, managing director.

BRITISH SECTION.

Head office: Kowloon. Cable address: Railway, Hongkong.

Manager.....	H. P. Winslow, Kowloon.
Engineer way and works.....	R. Baker, Kowloon.
Traffic assistant.....	W. G. Clark, Kowloon.
Traffic inspector.....	F. Aslett, Kowloon.
Locomotive superintendent.....	C. D. Lambert, Kowloon.
Assistant locomotive superintendent.....	Ingham Sutcliff, Kowloon.
Chief accountant.....	J. Morris, Kowloon.
Chief storekeeper.....	G. A. Walker, Kowloon.
Agents in England:	Crown Agents for the Colonies, 4 Milbank, Westminster, London, S. W.
Consulting engineers:	Sir J. Wolf Barry, Lyster & Partners, 2 Queen Anne's Gate, Westminster, S. W.

CHINESE PRIVATE RAILWAYS.**SUNNING (HSINNING) RAILWAY.**

Head offices: Sunning and Hongkong. President and manager: Chin Gee Hee, Sunning and Hongkong. Hongkong office: No. 151 Connaught Road.

SWATOW-CHAOCHOW (CHAO-SHAN) RAILWAY.

Chaochow & Swatow Railway Co. (Ltd.). Head office: Swatow. Cable address: Railway.

Managing director general.....	Chong Hong Nam, Swatow.
Acting director general.....	Chong Chee Hain, Swatow.
Director.....	Chong Chrong Hong, Swatow.
Secretary.....	W. T. Ching, Swatow.

CHANGCHOW-AMOY (CHANG-HSIA) RAILWAY (FUKIEN RAILWAY).

Head office: Amoy. Managing director: Wang Ching Hsien, Amoy.

CHINESE INDUSTRIAL RAILWAYS.

For the reason that in all cases these railways are managed by the industries served there are no particular officials for these short lines. It was therefore found impracticable to prepare a directory.

FOREIGN RAILWAYS IN CHINA.

YUNNAN (TIEN-YUEH) RAILWAY (INDO-CHINA RAILWAYS).

Head office: Hanoi, Tongking.

Chief department of public works.....Luis Constantine, Hanoi.
Assistant engineer in chief.....Antoine Meyer, Hanoi.

YUNNAN SECTION.

Manager of working and engineer in chief.....G. J. Chemin-Dupontes, Hanoi.
General chief of stores.....Pierre Foursand, Hanoi.

SHANTUNG (SANTO) RAILWAY.

Head office: Tsingtau (Seitou). Cable address: Santetsu.

Director of the railway department.....S. Sakaguchi, Tsingtau.
Bureau of general affairs.....K. Sugata, Tsingtau.
Traffic bureau.....K. Chiaki, Tsingtau.
Operation bureau.....Y. Funada, Tsingtau.
Financial bureau.....T. Sato, Tsingtau.
Wharf office.....K. Chiaka, Tsingtau.
Workshops.....K. Wada, Tsingtau.
Mining bureau.....S. Handa, Tsingtau.
Sales bureau.....M. Matsumoto, Tsingtau.

TRAMWAYS IN CHINA.

TIENTSIN TRAMWAYS.

These tramways are operated by the Compagnie de Tramways et d'Éclairage de Tientsin, Société Anonyme, with headquarters in Brussels, Belgium. Head office in China: Tientsin. Cable address: Tsintram. All the following officials are located in Tientsin:

General manager.....G. Gaillard
Chief engineer.....G. Rouffart.
Traffic and road manager.....F. Lahaye.
Mechanical engineer.....N. Vrancken.
Chief accountant.....A. Paternoster.

SHANGHAI TRAMWAYS.

These tramways are operated by the Shanghai Electric Construction Co. (Ltd.). Head office: No. 2 North Soochow Road, Shanghai. All the following officials are located in Shanghai:

General manager.....Donald McCall.
Deputy manager.....J. G. Smeaton.
Traffic manager.....E. Carroll.
Rolling stock superintendent.....J. L. Gordon.
Assistant rolling stock superintendent.....H. G. Sadler.
Line engineer.....H. J. Blatchford.
Assistant line engineer.....T. H. Brownlie.
Storekeeper.....J. L. Stuart.

Secretary in London: L. W. Hawkins, Basildon House, Mooregate, London, E. C.

HONGKONG TRAMWAYS CO. (LTD.).

Head office: Russell Street, Hongkong. Cable address: Snakefish. All the following officials are located in Hongkong:

Chairman.....Hon. C. E. Anton.
General manager and chief engineer.....J. J. S. Kennedy.
Assistant chief engineer.....R. J. Wilton.

Secretary.....W. E. Roberts.
Traffic superintendent.....A. Course.
Workshop superintendent.....A. K. Henderson.
Power engineer.....A. D. Macdonald.

PEAK TRAMWAYS CO. (LTD.).

Head office: Alexander Building, Hongkong. Cable address: Fencibles. The officials are located in Hongkong:

General managers.....John D. Humphreys & Son.
Superintending engineer.....C. B. Buyers.

IMPERIAL GOVERNMENT RAILWAYS OF JAPAN.

Head office: Gufukubashi, Marunouchi, Tokyo. Cable address: Kobusbo.

President.....Baron S. Goto, Tokyo.
Vice president.....K. Nakamura, Tokyo.

GENERAL STAFF.

Secretariat:

Director, section of documents and archives.....S. Nakanishi, Tokyo.
Director, section of personal affairs.....T. Inoki, Tokyo.
Secretary, section of relief insurance.....T. Nagai, Tokyo.
Engineer in chief, inspection section.....K. Hasigawa, Tokyo.
Engineer, railway investigation office.....T. Tariaka, Tokyo.
Coordinating secretary.....Y. Tsurumi, Tokyo.

General Administration Bureau:

Director.....E. Osonok (secretary), Tokyo.
Chief, general affairs.....Y. Osaki (secretary), Tokyo.
Chief, technical affairs.....T. O. Ito (engineer), Tokyo.

Traffic Bureau:

Director.....Y. Kmoshita, Tokyo.
Chief, general affairs.....D. Shono (engineer), Tokyo.
Passenger traffic manager.....S. Mikama (secretary), Tokyo.
Freight traffic manager.....J. Murai (secretary), Tokyo.
Transportation superintendent.....T. Furkawa (engineer), Tokyo.

Financial Bureau:

Director.....K. Morimoto, Tokyo.
Chief accountant.....U. Beppa (secretary), Tokyo.
Chief auditor.....T. Nagura (engineer), Tokyo.
Chief of stores.....S. Aoki (secretary), Tokyo.

Engineering Bureau:

Director.....S. Sugiusa, Tokyo.
Chief of design section.....M. Nawa (engineer), Tokyo.
Chief of extension section.....S. Omura (engineer), Tokyo.
Chief of maintenance of way and works section.....N. Okano (engineer), Tokyo.

Machinery and Rolling-Stock Bureau:

Director.....Y. Shima, Tokyo.
Chief of mechanical engineering section.....K. Sakuma (engineer), Tokyo.
Chief of electrical engineering section.....I. Inouye (engineer), Tokyo.

DIVISION STAFFS: EASTERN DIVISION.

Director.....Dr. T. Okado (engineer), Ueno, Tokyo.
Chief, general affairs.....G. Morega (secretary), Ueno, Tokyo.
Chief, traffic section.....R. Asahina (engineer), Ueno, Tokyo.
Chief, maintenance section.....C. Soyama (engineer), Ueno, Tokyo.
Chief, mechanical and electrical section.....S. Takasu (engineer), Ueno, Tokyo.
Chief, accounts section.....R. Yatabe (secretary), Ueno, Tokyo.
Omeya works manager.....S. Takasu (engineer).
Touchizaka works manager.....Y. Kaminasa (engineer).
Nagano works manager.....T. Okabe (engineer).
Moroka works manager.....S. Mayanagi (engineer).

CENTRAL DIVISION.

Director.....	
Chief, general affairs.....	H. Nagao, Shimbashi, Tokyo.
Chief, traffic section.....	S. Nakagawa (secretary), Shimbashi, Tokyo.
Chief, maintenance section.....	R. Nomura (engineer), Shimbashi, Tokyo.
Chief, mechanical and electrical section.....	H. Inagaki (engineer), Shimbashi, Tokyo.
Chief, accounts section.....	N. Fukushima (engineer), Shimbashi, Tokyo.
O-i works manager.....	S. Akiyama (engineer).
Hamamatsu works manager.....	M. Skida (engineer).
Yokkarchi works manager.....	K. Kishyanca (engineer).
Kanazawa works manager.....	S. Watanala (engineer).

WESTERN DIVISION.

Director.....	Y. Nomura, Kobe.
Chief, general affairs.....	M. Fukutomi (secretary), Kobe.
Chief, traffic section.....	Y. Kodaira (engineer), Kobe.
Chief, maintenance section.....	T. Eudo (engineer), Kobe.
Chief, mechanical and electrical section.....	S. Taguchi (engineer), Kobe.
Chief, accounts section.....	J. Shnasugi (secretary), Kobe.
Takatori works manager.....	S. Tabuchi (engineer).
Kobe works manager.....	S. Nakada (engineer).
Shimonoseki works manager.....	T. Kisu (engineer).
Yonago works manager.....	Y. Murao (engineer).

KYUSHU DIVISION.

Director.....	R. Daido, Moji.
Chief, general affairs.....	H. Hirata (secretary), Moji.
Chief, traffic section.....	K. Yoshikawa (junior secretary), Moji.
Chief, maintenance section.....	T. Furukawa (engineer), Moji.
Chief, mechanical and electrical section.....	K. Yamaguchi (engineer), Moji.
Chief, accounts section.....	S. Hirayama (junior secretary), Moji.
Kokura works manager.....	K. Yamaguchi (engineer).
Yakahashi works manager.....	K. Uyeda (engineer).
Wakamatsu works manager.....	O. Tsukma (engineer).

HOKKAIDO DIVISION.

Director.....	S. Suzuki, Sapporo.
Chief, general affairs.....	S. Koyano (secretary), Sapporo.
Chief, traffic section.....	K. Tamaka (secretary), Sapporo.
Chief, maintenance section.....	T. Omura (engineer), Sapporo.
Chief, mechanical and electrical section.....	I. Tamahashi (engineer), Sapporo.
Chief, accounts section.....	T. Yomhara (secretary), Sapporo.
Sapporo works manager.....	
Asahigawa works manager.....	K. Twamoto (engineer).
Hakoda works manager.....	Y. Oyamalla (engineer).

Inspection bureau in United States (Metropolitan Life Building, New York City):
Engineer in charge, S. Kobashi; T. Tiyama, K. Sakai.

SOUTH MANCHURIA RAILWAY CO.

Head office: Dairen. Cable address: Mantetsu.

Board of direction:	
Director in chief.....	Dr. S. Kunisawa, Dairen.
Director.....	T. Kawakami, Dairen.
Do.....	S. Kabayama, Dairen.
Do.....	K. Kaino, Dairen.
Do.....	R. Kawamura, Dairen.
Do.....	R. Tatsui, Dairen.

Secretariat:

Director.....	Dr. S. Kunisawa, Dairen.
Acting superintendent, section of personnel.....	K. Kawamura, Dairen.
Assistant superintendent, section of personnel.....	T. Yamanishi, Dairen.
Superintendent, inspection section.....	T. Tanabe, Dairen.
Department of general affairs:	
Director.....	T. Kawakami, Dairen.
Director, construction bureau.....	S. Hori, Dairen.
General superintendent, railway section.....	N. Tani, Dairen.
Superintendent and secretary, railway operation section and secretariat.....	K. Kaise, Dairen.
Superintendent, railway traffic section.....	T. Oka, Dairen.
Superintendent, maintenance of way section.....	T. Matsuda, Dairen.
Superintendent, public works section.....	Y. Kato, Dairen.
Superintendent, architectural section.....	K. Onogi, Dairen.
Superintendent, section of correspondence.....	J. Yamada, Dairen.
Superintendent, auditing and statistical section.....	I. Tadane, Dairen.
Superintendent, communications section.....	T. Mimoto, Dairen.
Superintendent, Shakako workshops.....	H. Mori, Dairen.
Superintendent, wharf offices.....	I. Narasaki, Dairen.
Superintendent, Shakako harbor works.....	K. Yamaji, Dairen.
In charge of Mukden office.....	Col. Sato, Mukden.
In charge of Harbin office.....	S. Shoji, Harbin.
In charge of Cheng Chiatino office.....	M. Hayakawa, Cheng Chiatino.
Mining department:	
Director.....	S. Kabayama, Dairen.
Chief engineer and superintendent, Fushun collieries.....	Dr. S. Yonekura, Fushun.
Superintendent coal sales section.....	S. Shirosaki, Dairen.
Chairman Anshan Steel Works, preparation committee.....	Y. Hatta, Dairen.
Superintendent, geological section.....	C. Kido, Dairen.
Land department:	
Director.....	K. Kaino, Dairen.
Central laboratory—	
Acting superintendent.....	K. Kaino, Dairen.
Chief, applied chemistry division.....	Y. Suzuki, Dairen.
Chief, analytical division.....	K. Higuchi, Dairen.
Chief, filature and weaving division.....	M. Matsuda, Dairen.
Chief, electrical chemistry.....	I. Namari, Dairen.
Superintendent, land section.....	K. Musai, Dairen.
Superintendent, hygienic section.....	Dr. K. Kasai, Dairen.
Superintendent, agricultural experimental station.....	J. Tochinai, Kungchuling.
Director, South Manchuria Medical College.....	Dr. Yamada, Dairen.
Principal, South Manchuria Technical School.....	K. Kori, Dairen.
Librarian, railway library.....	F. Shimamura, Dairen.
Superintendent, reference museum.....	F. Shimamura, Dairen.
Accounting department:	
Director.....	R. Kawamura, Dairen.
Accounting secretary.....	S. Mukaibo, Dairen.
Superintendent, stores section.....	K. Akiyama, Dairen.
Superintendent, electrical plants.....	H. Amemiya, Dairen.
Superintendent, gas works.....	S. Tomitsugu, Dairen.

TOKYO BRANCH OFFICE.

Director.....	R. Tatsui, Tokyo.
Secretary.....	M. Yamagaki, Tokyo.
Chief accountant.....	M. Ohwada, Tokyo.

KOREAN RAILWAYS SECTION.

Director.....	Y. Kubo, Seoul.
Secretary.....	K. Washio, Seoul.
Traffic manager.....	M. Audo, Seoul.
Superintendent, workshops section.....	M. Kurosawa, Seoul.
Superintendent, accounting section (stores).....	M. Kata, Seoul.
Superintendent, construction section.....	H. Kawayi, Seoul.
Superintendent, Seishin construction office.....	Y. Hisakado, Seishin.
Superintendent, Wonsan construction office.....	S. Ito, Wonsan.

KIRIN-CHANGCHUN RAILWAY.

Head office: Changchun. Cable address: Kichang Railway.

Managing director.....	Kon To, Changchun.
Engineer in chief.....	T. Magario, Changchun.
Chief of traffic.....	Changchun.
Chief accountant.....	J. Uchigaki, Changchun.

SSUPINGKAI-CHENGCHIATUN RAILWAY.

Head office: Ssupingkai.

Managing director.....	Yu Yu, Ssupingkai.
Chief engineer.....	J. Fujine, Ssupingkai.
Chief accountant.....	Ssupingkai.

MANILA RAILROAD CO. (LTD.).

Head office: Manila, Philippine Islands.

Director.....	Manuel Quezon, Manila.
Do.....	Francisco Ortigas, Manila.
Do.....	J. J. Rafferty, Manila.
Do.....	A. P. Fitzsimmons, Manila.
Do.....	Milton E. Springer, Manila.
Do.....	Felipe Caballero, Manila.
Do.....	J. F. Fernandez, Manila.
Do.....	Alesandro Ruiz, Manila.
Do.....	E. J. Westerhouse, Manila.
President.....	Manuel Quezon, Manila.
Vice president.....	Francisco Ortigas, Manila.
Secretary.....	P. A. Alexander, Manila.
Treasurer.....	J. H. Allen, Manila.
Comptroller.....	W. E. Brown, Manila.
General manager.....	E. J. Westerhouse, Manila.
Traffic manager.....	M. D. Roger, Manila.
Superintendent of transportation.....	T. McD. Rice, Manila.
Superintendent, Northern Lines.....	A. Casteller, Manila.
Superintendent, Southern Lines.....	C. U. Russell, Manila.
Superintendent, Albaylim Line.....	T. C. Macgregor, Manila.
Mechanical superintendent.....	F. H. Dodd, Caloocan, Manila.
Master car builder.....	J. Smedley, Caloocan, Manila.
Foreman of workshops.....	F. Kingsland, Caloocan, Manila.
Electrician.....	F. H. Haden, Caloocan, Manila.
Chief engineer.....	E. S. Von Piontkowski, Manila.
Principal assistant engineer.....	H. W. Corp, Manila.
Signal engineer.....	H. Fielding, Manila.
Superintendent of stores.....	W. Wallace, Caloocan, Manila.

PHILIPPINE RAILWAY CO.

New York office: 43-49 Exchange Place. Head office in Philippine Islands, Iloilo.
Cable address: Philrayco, New York and Iloilo.

Chairman of board.....	William Salomon, Middlebury, Vt.
President.....	Charles M. Swift, New York City.
Vice president.....	Clarence Lewis, New York City.
Do.....	J. H. Pardee, New York City.

Secretary-treasurer.....	J. W. Moffat, New York City.
Purchasing agent.....	E. N. Chilson, New York City.
Vice president and general manager.....	R. R. Hancock, Iloilo, P. I.
Auditor.....	E. G. Carrera, Iloilo, P. I.
Traffic agent.....	George P. Linden, Iloilo, P. I.
Purchasing agent.....	C. B. Sawyer, Iloilo, P. I.
General attorneys.....	Lawrence & Ross, Manila, P. I.

PANAY DIVISION.

Trainmaster.....	C. B. Sawyer, Iloilo, P. I.
Master mechanic.....	I. T. Brand, Iloilo, P. I.
Storekeeper.....	H. H. Sherrard, Iloilo, P. I.

CEBU DIVISION.

Superintendent.....	C. Jones, Cebu, P. I.
Master mechanic.....	M. E. Cleland, Cebu, P. I.
Storekeeper.....	J. H. Renner, Cebu, P. I.

MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION.

New York office: 43-49 Exchange Place. Head office in Philippine Islands: Manila.

President.....	Charles M. Swift, Middlebury, Vt.
Vice president.....	J. H. Pardee, New York City.
Secretary.....	J. W. Moffat, New York City.
Treasurer.....	R. B. Marchant, New York City.
Vice president and general manager.....	C. N. Duffy, Manila, P. I.
Assistant general manager.....	L. S. Cairns, Manila, P. I.
Manager railway department.....	W. R. McGeachin, Manila, P. I.
Manager lighting department.....	J. C. Rockwill, Manila, P. I.
Superintendent tracks.....	C. E. Haygood, Manila, P. I.
Superintendent shops.....	F. J. Ten, Manila, P. I.
Chief engineer power plant.....	B. H. Blaisdell, Manila, P. I.
General attorneys.....	Lawrence & Ross, Manila, P. I.

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Appendix 2.—CHINESE EASTERN RAILWAY.

AGREEMENT FOR THE CONSTRUCTION AND OPERATION OF THE CHINESE EASTERN RAILWAY, AUGUST 27/SEPTEMBER 8, 1896.

[Translation from French.]

Between the undersigned, His Excellency Shu King-chen, minister plenipotentiary of His Majesty the Emperor of China, at St. Petersburg, acting by virtue of an imperial edict, dated Kuang Hsu, 22d year, 7th month, 20th day (August 16/28, 1896), of the one part, and the Russo-Chinese Bank, of the other part, it has been agreed as follows:

The Chinese Government will pay the sum of 5,000,000 kuping taels to the Russo-Chinese Bank, and will participate in proportion to this payment in the profits and losses of the bank, on conditions set forth in a special contract.

The Chinese Government having decided upon the construction of a railway line, establishing direct communication between the city of Chita and the Russian South Ussuri Railway, entrusts the construction and operation of this railway to the Russo-Chinese Bank upon the following conditions:

1. The Russo-Chinese Bank will establish for the construction and operation of this railway a company under the name of the Chinese Eastern Railway Co.

The seal which this company will employ will be given to it by the Chinese Government. The statutes of this company will be in conformity with the Russian usages in regard to railways. The shares of the company can be acquired only by Chinese or Russian subjects. The president of this company will be named by the Chinese Government, but paid by the company. He may have his residence in Peking.

It will be the duty of the president to see particularly to the scrupulous fulfillment of the obligations of the bank and of the railway company toward the Chinese Government; he will furthermore be responsible for the relations of the bank and of the railway company with the Chinese Government and the central and local authorities.

The president of the Chinese Eastern Railway Co. will likewise be responsible for examining all accounts of the Chinese Government with the Russo-Chinese Bank.

To facilitate in local negotiations, the Russo-Chinese Bank will maintain an agent at Peking.

2. The route of the line will be determined by the deputies of the president (named by the Chinese Government) of the company, in mutual agreement with the engineers of the company and the local authorities. In laying out this line, cemeteries and tombs, as also towns and villages, should, so far as possible, be avoided and passed by.

3. The company must commence the work within a period of 12 months from the day on which this contract shall be sanctioned by imperial decree, and must so carry it on that the whole line will be finished within a period of six years from the day on which the route of the line is definitely established and the lands necessary therefor are placed at the disposal of the company. The gauge of the line should be the same as that of the Russian railways (5 Russian feet, about 4 feet 2½ inches Chinese).

4. The Chinese Government will give orders to the local authorities to assist the company to the extent of their ability in obtaining, at current prices, the materials necessary for the construction of the railway, as also laborers, means of transport by water and by land, the provisions necessary for the feeding of men and animals, etc.

The Chinese Government should, as needed, take measures to facilitate such transportation.

5. The Chinese Government will take measures to assure the safety of the railway and of the persons in its service against any attack.

The company will have the right to employ, at will, as many foreigners or natives as it may find necessary for the purpose of administration, etc.

Criminal cases, lawsuits, etc., upon the territory of the railway, must be settled by the local authorities in accordance with the stipulations of the treaties.

6. The lands actually necessary for the construction, operation, and protection of the line, as also the lands in the vicinity of the line necessary for procuring sand, stone, lime, etc., will be turned over to the company freely, if these lands are the property

of the State; if they belong to individuals, they will be turned over to the company either upon a single payment or upon an annual rental to the proprietors, at current prices. The lands belonging to the company will be exempt from all land taxes ("impôt foncier").

The company will have the absolute and exclusive right of administration of these lands. ("La société aura le droit absolu et exclusif de l'administration de ses terrains.")

The company will have the right to construct on these lands buildings of all sorts, and likewise to construct and operate the telegraph necessary for the needs of the line.

The income of the company, all its receipts, and the charges for the transportation of passengers and merchandise, telegraphs, etc., will likewise be exempt from any tax or duty. Exception is made, however, as to mines, for which there will be a special arrangement.

7. All goods and materials for the construction, operation, and repair of the line will be exempt from any tax or customs duty and from any internal tax or duty.

8. The company is responsible that the Russian troops and war material, dispatched in transit over the line, will be carried through directly from one Russian station to another, without for any pretext stopping on the way longer than is strictly necessary.

9. Passengers who are not Chinese subjects, if they wish to leave the territory of the railway, should be supplied with Chinese passports. The company is responsible that passengers who are not Chinese subjects should not leave the territory of the railway if they do not have Chinese passports.

10. Passengers' baggage, as well as merchandise dispatched in transit from one Russian station to another, will not be subject to custom duties; they will likewise be exempt from any internal tax or duty. The company is bound to dispatch such merchandise, except passengers' baggage, in special cars, which, on arrival at the Chinese frontier, will be sealed by the office of the Chinese customs, and can not leave Chinese territory until after the office of the customs shall have satisfied itself that the seals are intact; should it be established that these cars have been opened on the way without authorization, the merchandise would be confiscated.

Merchandise imported from Russia into China by the railway, and likewise merchandise exported from China into Russia by the same route, will respectively pay the import and export duty of the Chinese Maritime Customs, less one-third.

If merchandise is transported into the interior it will pay in addition the transit duty—equivalent to a half of the import duty collected—which frees it from any further charge.

Merchandise not paying the transit tax will be subject to all the barrier and liken duties imposed in the interior.

The Chinese Government must install customs offices at the two frontier points on the line.

11. The charges for the transportation of passengers and of merchandise, as well as for the loading and unloading of merchandise, are to be fixed by the company, but it is obliged to transport free of charge the Chinese official letter post, and, at half price, Chinese land or sea forces and also Chinese war materials.

12. The Chinese Government transfers to the company the complete and exclusive right to operate the line on its own account and risk, so that the Chinese Government will in no case be responsible for any deficit whatsoever of the company, during the time allotted for the work and thereafter for a further 80 years from the day on which the line is finished and traffic in operation. This period having elapsed, the line, with all its appurtenances, will pass free of charge to the Chinese Government.

At the expiration of 36 years from the day on which the entire line is finished and traffic in operation, the Chinese Government will have the right to buy back this line upon repaying in full all the capital involved, as well as all the debts contracted for this line, plus accrued interest.

If—in case the profit realized exceeds the dividends allowed to the shareholders—a part of such capital is repaid, that part will be deducted from the price of repurchase. In no case may the Chinese Government enter into possession of this line before the appropriate sum is deposited in the Russian State Bank.

The day when the line is finished and traffic in operation, the company will make to the Chinese Government a payment of 5,000,000 kuping taels.

Kuang Hsu, 22nd year, 8th month, 2nd day.

Shu.

Berlin, August 27/September 8, 1896.

Russo-Chinese Bank.

ROTHSTEIN.

PRINCE OURKOTOMSKY.

AGREEMENT CONCERNING SOUTHERN MANCHURIAN BRANCH OF CHINESE EASTERN RAILWAY CO.

[Translation from Chinese.]

PREAMBLE.—Hsu (Ching-ch'eng), ambassador (?) of the Imperial Chinese Government, and Yang (ju), minister of the Imperial Chinese Government to Russia, have received an imperial decree of the 7th of the Fifth Moon, XXIV year of Kuang Hsu, that is the 13th of June, 1898, Russian calendar (June 25, 1898, new style), authorizing them to draw up a contract with the Chinese Eastern Railway Co. in accordance with the provisions of the treaty between China and Russia, entered into at Peking on the 6th of the Third Moon, XXIV year of Kuang Hsu, i. e. March 15, 1898, Russian calendar (March 27, 1898, N. S.) and those of the special supplementary articles to the same, agreed upon at St. Petersburg on the 17th of the Intercalary Third Moon—April 25, 1898—(May 7, 1898, N. S.) to the effect that, from the date of the signing of said treaty by the Chinese Government, in accordance with the permission given in the XXII year of Kuang Hsu (1896) to the Chinese Eastern Railway Co. to construct certain railways, a branch line might be built and operated, which should begin at a station, to be selected on the main line of the Chinese Eastern Railway, and extend to the seaports, Dalny and Port Arthur in the Liaotung Peninsula; the said branch line to be dealt with in careful compliance with the terms of the contract of the 2d of the Eighth Moon, XXII Year of Kuang Hsu, August 27, 1896, Russian calendar (Sept. 8, 1896, N. S.) between the Chinese Government and the Russo-Chinese Bank.

In accordance with the foregoing provisions the following articles relating to the construction and operation of a railway through Manchuria are now agreed upon, to-wit:

ARTICLE I. This branch of the Chinese Eastern Railway, extending to the seaports of Port Arthur and Dalny, shall be known as the Southern Manchurian Branch of the Chinese Eastern Railway.

ART. II. In accordance with article IV of the contract of the 2d of the Eighth Moon, XXII year of Kuang Hsu, August 27, 1896 (Sept. 8, 1896, N. S.), which provides that the Chinese Government shall take steps as occasion may require to facilitate the bringing in of the materials needed for the construction of the line, whether transported by water or by land, it is now agreed that the company may employ steamers or other vessels, and such vessels flying the company's flag shall be permitted to proceed up the Liao River or any of its branches, and to enter Yingkow (the port of Newchwang) or any port in the neutral territory which may prove advantageous to the work of constructing this line, and may there discharge cargo.

ART. III. In order to facilitate the bringing in by the Chinese Eastern Railway Co. of the materials and provisions needed in the construction of the Southern Manchurian Branch, it is permitted the company to build temporary branch lines from this road to Yingkow and to seaports in the neutral zone, but when the work of building the line is completed and the road is open for traffic the company must at the notice of the Chinese Government remove these branch railways; that is to say, within eight years from the date of the survey and determination of the line and the appropriation of the land for its construction these temporary branch lines must be removed.

ART. IV. In accordance with the permission granted to the company in the XXIII year of Kuang Hsu (1897) to cut timber and mine coal for the use of the railway, it is now agreed to allow the company to fell timber at its pleasure in the forests on government lands, each tree to be paid for at a price to be fixed by the engineer in chief or his deputy in consultation with the local authorities, but not higher than the local market rate. But no forests on property in the province of Shengking belonging to the imperial family, or on sites that affect the "feng-shui," being under the direct control of the Peking Government may be injured or disturbed.

The company shall also be allowed in the regions traversed by this branch line to mine such coal as may be needed for the construction or operation of the railway, the price of which coal shall be fixed by the engineer in chief or his deputy in consultation with the local authorities but shall not exceed the royalty paid by other parties in the same locality.

ART. V. Within the leased territory on the Liaotung Peninsula Russia may fix the customs tariff to suit itself, and China may levy and collect duties at the boundaries on all goods going from the leased territory to the interior or from the interior to the leased territory. In dealing with this matter China may arrange with Russia for the latter Government to establish the customs at Dalny and from the date of the opening of the said port to international trade to appoint the Chinese Eastern Railway Co. to act as the agent of the Chinese Imperial Board of Revenue to open and manage the customs and in its behalf to levy and collect duties. The said customs shall be under

the sole control of the Peking Government, to which the said agent shall from time to time report its management. In addition there shall be appointed a Chinese civil official to be stationed as deputy at the customs. All baggage of passengers and all goods brought from railway stations within the Russian boundaries by the said line into the territory leased to Russia in the Liaotung Peninsula, or shipped from the said leased territory into the Russian Empire shall be entirely free of all customs duties as well as of all inland transit and likin dues. Goods shipped by rail from the interior of China to the leased territory or from the leased territory to the interior must pay export or import duties respectively according to the Imperial Maritime Customs tariff without increase or reduction.

ART. VI. The company may at its pleasure assume the responsibility of establishing a line of seagoing vessels flying the company's flag, to be operated under the regulations for foreign mercantile shipping. Should these vessels or the management of the business in connection therewith occasion any financial loss, the Chinese Government shall not be held responsible. Passenger fares and freight rates shall be established by the company to suit itself, and shall in nowise concern the railway. The period of the management of the said enterprise being of course unlimited, the provisions of Article XII of the Contract between the Chinese Government and the Russo-Chinese Bank of the XXII year of Kuang Hsu (1896) fixing a price for the purchase of the railway, and a date for its reversion to China without payment, shall not apply to this undertaking.

ART. VII. As to the location of the Southern Manchurian Railway Line, and the determination of the places through which it shall pass, it will be necessary to wait until the engineer in chief shall have surveyed the route through Manchuria and made report of the conditions to the head office of the company, when the company or its agent in Peking shall consult with the director general of the railway and decide the matter.

Appended is the text of the above agreement, as telegraphed by the Chinese Eastern Railway Co. to the Tsung Li Yamen.

PREAMBLE OF AGREEMENT.—In accordance with treaty of Peking of 6th of Third Moon and special articles of Intercalary Moon, extension of Chinese Eastern Railway Co., to build and operate a branch line from station to be selected on main line to seaports Port Arthur and Dalny in Liaotung. Careful compliance with provisions of Russo-Chinese Bank's contract. Supplementary articles proposed as follows:

1. This branch line, extending to Port Arthur and Dalny, shall be known as the Southern Manchurian Branch of Chinese Eastern Railway.

2. Original agreement, article IV, (provides) Chinese Government to take steps to facilitate transport by land or water of materials for construction of railway. Company permitted to employ steamships or other vessels flying company's flag which may enter Liao River and branches and proceed to Yingkow and all seaports in neutral zone and there unload materials.

3. In order to facilitate shipment of materials and provisions, company permitted to construct temporary branch lines from Southern Manchurian line to Yingkow and seaports in neutral zone, but when the work of building railway is completed and whole line open to traffic, all these temporary branch lines to be removed at pleasure of Chinese Government.

4. The Chinese Government in First Moon last year granted permission to obtain coal and wood. Company now allowed to fell timber in forests on government lands, price of each tree to be fixed by local authorities in conference with engineer in chief, but not to be made higher than local market rate. But, forests in province of Shengking, property of imperial family, affecting "feng-shui," under control of Peking Government, not allowed to be touched.

Company also permitted in localities through which this branch line passes to mine coal, payment for same also to be determined by conference but not to be more than paid by others.

5. Within the leased territory Russia to determine for itself the customs tariff. China must collect duties on goods at the boundary of leased territory. With respect to this matter arrangements may be made permitting Russia on opening of Dalny to international trade to establish the customs at that port and appoint the company to act as agent of Chinese Imperial Board of Revenues, levying and collecting duties, under direct control of Peking Government, and reporting its management to same from time to time. Goods coming from railway stations within the Russian boundaries into the leased territory or from the latter into Russia to be free of all customs duty and likin charges; those going by railway from leased territory into the interior of China or from interior to leased territory to pay duty according to tariff of Imperial Maritime Customs without increase or reduction.

6. Company allowed to establish line of merchant steamships flying company's flag. If any financial loss, China not responsible; this business not to involve the

railway, and not to be dealt with under provisions of original contract fixing price for purchase (of railway) and date for reversion (without payment).

7. Location of line of Southern Manchurian Railway and determination of places through which it will pass to await surveys in Manchuria by engineer in chief when company or its agent in Peking will consult with director general and decide.

The above is translated by Cheng Ju-chiang from the complete text of letter received from Chinese Eastern Railway, omitting unimportant words and phrases, this third day of Fourth Moon, Kuang Hsu XXIV Year (May 22, 1898).

NOTE.—The substance of the agreement was telegraphed on May 22, 1898, and the final text was prepared on June 24, 1898. The only important change was the addition in the final text of article V, providing for the appointment of a Chinese deputy to be stationed at the customs in Dalny.

STATUTES OF THE CHINESE EASTERN RAILWAY CO.

1. On the strength of the agreement concluded on August 27, 1896, by the Imperial Chinese Government with the Russo-Chinese Bank, a company is formed under the name of the Chinese Eastern Railway Co., for the construction and working of a railway within the confines of China, from one of the points on the western borders of the Province of Heilungkiang to one of the points on the eastern borders of the Province of Kirin, and for the connection of this railway with those branches which the Imperial Russian Government will construct to the Chinese frontier from Trans-Baikalia and the Southern Ussuri lines.

The company is empowered, subject to the sanction of the Chinese Government, to exploit, in connection with the railway, or independently of it, coal mines, as also to exploit in China other enterprises—mining, industrial, and commercial. For the working of these enterprises, which may be independent of the railway, the company shall keep accounts separate from those of the railway.

The formation of the company shall be undertaken by the Russo-Chinese Bank.

With the formation of the company all rights and obligations are transferred to it in regard to the construction and working of the line ceded in virtue of the above-named agreement of August 27, 1896.

The company shall be recognized as formed, on the presentation to the Minister of Finance of a warrant of the State Bank, certifying the payment of the first instalment on the shares. In any case, such payment must be made not later than two months from the day of confirmation of the present statutes.

The succeeding instalments on the shares shall be paid in such order of gradation that the shares shall be fully paid up at their nominal value not later than one year from the day of formation of the company.

Owners of shares of the company may only be Russian and Chinese subjects.

2. In virtue of the agreement with the Chinese Government the company shall retain possession of the Chinese Eastern Railway during the course of 80 years from the day of the opening of traffic along the whole line.

3. In recognition that the enterprise of the Chinese Eastern Railway will be realized only owing to the guaranty given by the Russian Government in regard to the revenue of the line for covering working expenses as well as for effecting the obligatory payments on the bonds (sections 11 and 16) the company on its part binds itself to the Russian Government, during the whole term of the concession, under the following obligations:

(A) The Chinese Eastern Railway, with all its appurtenances and rolling stock, must be always maintained in full order for satisfying all the requirements of the service of the line in regard to the safety, comfort, and uninterrupted conveyance of passengers and goods.

(B) The traffic on the Chinese Eastern line must be maintained conformably with the degree of traffic on the Russian railway lines adjoining the Chinese line.

(C) The trains of all descriptions running between the Russian Trans-Baikal and Ussuri lines shall be received by the Chinese Eastern Railway and dispatched to their destination, in full complement, without delay.

(D) All through trains, both passenger and goods, shall be dispatched by the Chinese Eastern Railway at rates of speed not lower than those which shall be adopted on the Siberian Railway.

(E) The Chinese Eastern Railway is bound to establish and maintain a telegraph along the whole extent of the line, and to connect it with the telegraph wire of the Russian adjoining railways, and to receive and dispatch without delay through telegrams sent from one frontier station of the line to another, as also telegrams sent from Russia to China, and conversely.

(F) Should, with the development of traffic on the Chinese Eastern Railway, its technical organization prove insufficient for satisfying the requirements of a regular

and uninterrupted passenger and goods traffic, the Chinese Eastern Railway shall immediately, on receipt of a notification on the part of the Russian Railways to augment its capacity to a corresponding degree, adopt the necessary measures for further developing its technical organization and traffic on it. In the event of a difference of opinion arising between the above-mentioned railways, the Chinese Eastern Railway shall submit to the decision of the Russian Minister of Finance. If the means at the command of the Chinese Eastern Railway prove insufficient for carrying out the necessary work of its development, the board of management of the railway may at all times apply to the Russian Minister of Finance for pecuniary assistance on the part of the Russian Government.

(G) For all transit conveyance of passengers and goods, as also for the transmission of telegrams, there will be established by agreement of the company with the Russian Government, for the whole term of duration of the concession, maximum tariffs, which can not be raised without the consent of the Russian Government during the whole term above referred to. Within these limits the tariffs of direct communication, both for railway carriage and telegrams, will be fixed by the board of management of the company, on the strength of a mutual agreement with the Russian Minister of Finance.

(H) The Russian letter and parcels post, as also the official accompanying them, shall be carried by the Chinese Eastern Railway free of charge.

For this purpose the company shall set apart in each ordinary passenger train a carriage compartment of three fathoms in length. The Russian postal authorities may, moreover, if they deem it necessary, place on the line postal carriages, constructed by them at their own cost; and the repair, maintenance (interior fitting excepted), as well as the running of such carriages with the trains, shall be free of charge and at the cost of the railway.

The above-mentioned engagements, by which, as already stated, the grant of a guaranty by the Russian Government is conditioned, and the consequent realization of the enterprise of the Chinese Eastern Railway, shall be binding on the railway until the same, after the expiration of the 80 years' term of the concession, shall, without payment, become the property of the Chinese Government (section 29). The redemption of the line from the company before the above-mentioned term, in accordance with section 30 of the present statutes, shall not in any way diminish the effect of the above-specified engagements, and these latter, together with the railway, shall be transferred to its new proprietor.

In the same manner, during the course of the whole 80 years' term of the concession (section 2) the following privileges granted to the railway by the Imperial Chinese Government shall remain in force:

(a) Passengers' luggage, as also goods, carried in transit from one Russian station, shall not be liable to any Chinese customs duties, and shall be exempt from all internal Chinese dues and taxes.

(b) The rates for the carriage of passengers and goods, for telegrams, etc., shall be free from all Chinese taxes and dues.

(c) Goods imported from Russia into China by rail, and exported from China to Russia in the same manner, shall pay respectively an import or export Chinese duty to the extent of one-third less as compared with the duty imposed at Chinese seaport customhouses.

(d) If goods imported by the railway are destined for conveyance inland, they shall in such case be subject to payment of transit duty to the extent of one-half of the import duty levied on them, and they shall then be exempted from any additional imposts. Goods which shall not have paid transit duty shall be liable to payment of all established internal carrier and likin dues.

4. In regard to the place of acquisition of material for the requirements of the railway, the company shall not be liable to any limitations. If materials be obtained beyond the confines of Russia, they shall on importation through Russian territory be freed from payment of Russian customs duties.

5. The breadth of the railway track must be the same as that of the Russian lines (5 feet).

The company must commence the work not later than August 16, 1897, and conduct it in such a manner that the whole line shall be completed not later than six years from the time when the direction of the line shall be finally determined and the necessary land assigned to the company.

When tracing the line of the railway, cemeteries and graves, as also towns and villages, must, so far as possible, be left aside of the railway.

When effecting the connection, in accordance with section 1 of these statutes, of the Chinese Eastern Railway with the Russian Trans-Baikal and South Ussuri lines, the company shall have the right, with a view of reduction of expenditure, of abstaining from building its own frontier stations, and of utilizing the frontier

stations of the above-named Russian lines. The conditions on which they shall be so utilized shall be determined by agreement of the board of the company with the boards of the respective railways.

6. The tariffs for the carriage of passengers and goods, as also for supplementary carriage rates, shall be determined by the company itself within the limits indicated in section 3.

7. Crimes, litigation, etc., on the territory of the Chinese Eastern Railway shall be dealt with by the local authorities, Chinese and Russian, on the basis of existing treaties.

In regard to the carriage of passengers and goods, the responsibility for such conveyance, the lapse of time for claims, the order of recovering money from the railway when adjudged, and the relations of the railway to the public shall be defined in rules drawn up by the company and established before the opening of the railway traffic; and these rules shall be framed in accordance with those existing on the Russian railways.

8. The Chinese Government has undertaken to adopt measures for securing the safety of the railway and of all employed on it against any extraneous attacks.

The preservation of order and decorum on the lands assigned to the railway and its appurtenances shall be confided to police agents appointed by the company.

The company shall for this purpose draw up and establish police regulations.

9. The whole amount of the capital of the company shall be determined according to the cost of construction, calculated on the basis of estimates framed when the survey of the line was carried out. The foundation capital shall be charged with (a) the payment of interest and amortization of the foundation capital during the construction of the railway; (b) the purchase from the Russian Government of the results of the surveys of the direction of the railway to Manchuria which were made by Russian engineers; the sum payable for these surveys will be determined by agreement of the Russian Minister of Finance with the company. The capital of the company shall be formed by the issue of shares and bonds.

10. The capital of the company shall be fixed at 5,000,000 nominal credit roubles, and divided into 1,000 shares at 5,000 nominal credit roubles.

The shares are to be issued at their nominal value.

The guaranty of the Russian Government does not extend to them.

11. The remaining portion of the capital of the company will be formed by the issue of bonds. The bonds will be issued in measure of requirement, and each time with the special sanction of the Minister of Finance. The nominal amount and value of each separate issue of bonds, the time and condition of the issue, as also the form of these bonds, shall be subject to the sanction of the Minister of Finance.

The Russian Government will guarantee the interest on and amortization of the bonds.

For the realization of these bonds the company must have recourse to the Russo-Chinese Bank, but the Russian Government reserves to itself the right of appropriating the bond loan at a price which shall be determined between the company and the bank, and to pay to the company the agreed amount in ready money.

12. As payments are received for bonds guaranteed by the Russian Government, the company shall be bound to keep such sums, or interest bearing securities purchased with the same by permission of the Russian Minister of Finance, under the special supervision of the Russian Ministry of Finance.

Out of the above receipts the company shall have the right to make the following payments:

(a) According to actual fulfilment of the work in progress and execution of orders, and at the time when various expenditure shall become necessary, such payments to be made on the scale and on the conditions specified in the working estimates.

(b) During the construction of the line, of interest, as it becomes due on the bonds issued by the company, subject to the conditions of their issue, and the company shall pay the sums necessary for the above purpose within the limits of the amount realized by it in the emission of its bonds.

13. On the payment of the first allotment on the shares the founder shall receive temporary certificates, on which subsequently, when the board of management of the company shall have been formed, the receipt of the further installments on the shares will be inscribed.

When the shares shall be fully paid up, the temporary certificates issued to the founders shall be replaced by shares.

The shares of the company are issued to bearer, under the signature of not fewer than three members of the board of management. To the shares will be attached a coupon sheet for the receipt once yearly under them of any dividend that may be payable. On the coupon sheets becoming exhausted new sheets will be issued. A dividend on the shares out of the net profits of any year, supposing such accrue,

shall be payable on the adoption by the general meeting of shareholders of the annual report for that year, and the dividend shall be payable at the offices of the company, or at such places as it may indicate.

The company shall notify for general information in the Official Gazette and in the Finance Messenger, as also in one of the Chinese newspapers, the extent and place of payment of the dividend.

14. The reserve capital is destined:

(a) For the capital repair of the railway, its buildings, and appurtenances.
(b) For defraying extraordinary expenditure of the company in repairing the railway and its appurtenances.

The reserve capital of the company is formed out of annual sums put aside from the net profits of the working of the railway (section 17).

The reserve capital must be kept in Russian State interest-bearing securities, or in railway bonds guaranteed by the Russian Government.

At the expiration of the term of possession of the railway by the company the reserve capital shall be first of all employed in the payment of the debts of the company, including among them sums due to the Russian Government, if such exist; and after the debts of the company shall have been paid the remainder of the reserve capital shall be divided among the shareholders. In the event of the redemption of the railway by the Chinese Government, the reserve capital becomes the property of the shareholders.

15. The net revenue of the company shall be the remainder of the gross receipts after deduction of working expenses. Under these expenses are classed—

(a) General outlays, including assignments toward pension and relief funds if such be established on the line.

(b) Maintenance of the staff of the board of management, and of all the services, as also the maintenance of employees and laborers not on the permanent list.

(c) Outlays for material and articles used for the railway, as also expenditure in the shape of remuneration for using buildings, rolling stock, and other various requisites for the purposes of the railway.

(d) Outlays for the maintenance, repair, and renewal of the permanent way, works of construction, buildings, rolling stock, and other appurtenances of the railway.

(e) Expenditures connected with the adoption of the measures and instructions of the board of management for insuring the safety and regularity of the railway service.

(f) Expenditure for the improvement and development of the railway, as also for creating and developing its resources.

16. Should the gross receipts of the railway prove insufficient for defraying the working expenses and for meeting the yearly payments due on the bonds, the company will receive the deficient sum from the Russian Government, through the Minister of Finance of Russia. The payments referred to will be made to the company as advances, at a rate of interest of 6 per cent per annum. Sums paid in excess to the company, in consequence of its demands and on account of the guaranty, will be deducted from succeeding money payments.

On the presentation to the general meeting of shareholders of the annual report of the working of the railway for a given year, the company shall at the same time submit to the general meeting, for confirmation, a detailed statement of the sums owing by the company to the Russian Government, with the interest that has accrued thereon. On the confirmation of this statement by the general meeting the board of management shall deliver to the Russian Government an acknowledgment of the company's debt, to the full determined amount of the same, and this acknowledgment, until its substitution by another, shall bear annually interest at the rate of 6 per cent.

The acknowledgment above mentioned, given by the board of management to the Russian Government, shall not be subject to bill or deed stamp tax.

Subjects of minor importance are dealt with in the following sections:

17. Distribution of net profits of the railway.

18. Functions of the board of management, the seals of which will be at Peking and St. Petersburg.

19. Constitution of the board, which is to consist of nine members, elected by the shareholders. The chairman is to be appointed by the Chinese Government. The vice chairman is to be chosen by the members of the board from among themselves.

20. Order of transaction of the business of the board.

21. General meetings of the shareholders, and the subjects that shall come under their notice.

22. Order of convening general meetings.

23. Conditions under which general meetings shall be recognized as legally held.
24. Participation of shareholders in proceedings of general meetings.
25. Local management of railway when in working order.
26. Local management of works of construction.
27. Questions to be submitted for confirmation by the Russian Minister of Finance.
28. Committee of audit.
29. In accordance with the agreement concluded with the Chinese Government, the latter, after the expiration of 80 years of possession of the railway by the company, enters into possession of it and its appurtenances.

The reserve and other funds belonging to the company shall be employed in paying the money due to the Russian Government under the guaranty (section 16) and in satisfaction of other debts of the company, and the remainder shall be distributed among the shareholders.

Any money that may remain owing by the company to the Russian Government at the expiration of 80 years in respect of the guaranty shall be written off. The Russo-Chinese Bank will incur no responsibility in respect of the same.

30. In accordance with the agreement concluded with the Chinese Government, on the expiration of 36 years from the time of completion of the whole line and its opening for traffic, the Chinese Government has the right of acquiring the line, on refunding to the company in full all the outlays made on it, and on payment for everything done for the requirements of the railway, such payments to be made with accrued interest.

It follows as a matter of course that the portion of the share capital which has been amortized by drawing, and the part of the debt owing to the Russian Government under the guarantee, and repaid out of the net profits (section 17), will not constitute part of the purchase money.

In no case can the Chinese Government enter into possession of the railway before it has lodged the necessary purchase money in the Russian State Bank.

The purchase money lodged by the Chinese Government shall be employed in paying the debt of the company under its bonds, and all sums, with interest, owing to the Russian Government, the remainder of the money being then at the disposal of the shareholders.

Appendix 3.—PEKING-HANKOW RAILWAY.

LOAN FOR THE RAILWAY FROM LUKOWKIAO TO HANKOW.

(Provisional) contract between the Chinese Railway Co. and the Société Financière et Industrielle Belge en Chine, the following has been agreed upon:

ARTICLE 1. The Chinese Government has granted a concession for the railway line from Lukowkiao, near the city of Peking, to Hankow, to the Chinese Railway Co., which has already a capital of 13,000,000 taels.

The said company is authorized by the Imperial Government to negotiate a loan of £4,500,000 to be applied solely to the building and working of the line from Lukowkiao to Hankow; the provisions hereafter set forth must be observed by the Chinese Railway Co. as well as by the Société Financière et Industrielle Belge en Chine.

ART. 2. Said loan of a nominal value of £4,500,000, with 10 per cent discount, or a real value of £4,050,000, is agreed to by the Société Financière et Industrielle Belge en Chine. It will be paid in four installments of £1,012,500, representing the real value and at the following dates:

First payment: January 3, 1898.

Second payment: July 3, 1898.

Third payment: January 3, 1899.

Fourth payment: July 3, 1899.

These payments will be made into a Belgian bank of Brussels, chosen by the Chinese Railway Co., which is at liberty to transfer this sum as it sees fit.

ART. 3. The loan agreed to by the Société Financière et Industrielle Belge en Chine shall bear annual interest of 4 per cent. Said interest shall be paid in January and July of each year.

ART. 4. The Chinese Railway Co. agrees to reimburse the loan provided for in the present convention, after the first 10 years, in 20 annuities of £2,225,000, payable yearly after January 3, 1909.

The payment of interest and annuities will be made in China, into a bank designated by the Société Financière et Industrielle Belge en Chine, and in conformity with the table of amortization annexed to the present convention.

ART. 5. With the authorization of the Imperial Chinese Government, the payment of interest and the refunding of the loan will be guaranteed by the railway line from Lukowkiao to Hankow as also by all the property and material connected therewith.

It is understood that the guaranties given for the loan provided for in the present convention are reserved for the subscribers to the present loan and that the guaranties given for subsequent loans can nowise prejudice that now granted the Société Financière et Industrielle Belge en Chine.

ART. 6. Except in case of force major, the work of building must be finished and the railway from Lukowkiao to Hankow put in operation before the expiration of five years, that is to say, of 1903.

ART. 7. The contracting parties may not invoke a state of war existing in any part of the world not to keep their engagements. If said state of war should exist in China, the Belgian staff shall remain in the employ of the Chinese Railway Co., unless its assistance is asked for by the Imperial Chinese Government.

ART. 8. The Société Financière et Industrielle Belge en Chine shall choose an experienced, reliable, and honest engineer to represent it, who shall be charged with controlling the technical work; he shall, furthermore, be charged with drawing up plans and carrying them out under the exclusive authority of the general director of the Chinese Railway Co., under whose direct orders he shall be. This controlling engineer will be under the absolute direction of the general director of the Chinese Railway Co. The Chinese Railway Co. reserves all rights of management of the railway. It will be responsible until the expiring of the present contract for the salary of this controlling engineer as fixed upon in agreement with the Société Financière et Industrielle Belge en Chine.

ART. 9. The foreign staff needed by the Chinese Railway Co. for building and operating the line during the life of the present contract shall be chosen and presented by the technical controlling engineer representing the Société et Financière Industrielle

Belge en Chine; it will be appointed by decision of the director general of the Chinese Railway Co. The Chinese Railway Co. is at liberty to settle for itself, as regards its foreign staff, the form of engagement to be used, adopting long or short term contracts.

All the staff employed by the Chinese Railway Co. and attached to the working of the line with the exception of the controlling engineer will be required to obey the Chinese delegates of the director general of the company and work harmoniously with all the Chinese and foreign staff of other nationalities, chosen and appointed by the director general to any position, and this in the interest of the railway company.

If disputes arise between European and Chinese agents, they shall be impartially settled by the director general, aided by the representative of the Belgian company.

The director general of Chinese railways shall always be at liberty to designate foreigners of whatever nationality to inspect the works under way; the Belgian company shall never have the right to prevent it.

Nevertheless, the duty of the persons so designated shall only consist in inspecting works and they shall never have the right to give orders to the staff employed in building and working the line. Such persons may likewise make reports to the director general of Chinese railways on the results of their inspections.

The staff employed in building and operating shall furnish all necessary facilities to foreigners entrusted with an inspection, and that in the interest of the Chinese Railway Co.

Arr. 10. In case one of the foreign employees referred to in articles 8 and 9, irrespective of duties, should through carelessness, incapacity, disobedience of the orders of the director general, insubordination, drunkenness, or bad conduct, be held to be unfit for the service, the director general shall have the right to cancel the contract and the dismissed agent shall leave at once the service of the Chinese Railway Co.

Arr. 11. The materials necessary for the Chinese Railway Co., exclusive of all that can be manufactured in China or of that that can be manufactured there later on, shall be bought abroad.

The director general shall decide, in consultation with the controlling engineer, the amount of materials to ask bids on; said quantity, however, shall never exceed 50 per cent of that required.

The award shall be made without any special favor for the Société Financière et Industrielle Belge en Chine. If this company agrees to furnish at perfect equality of conditions as to quality, price, and carriage with those secured by the Chinese Railway Co., the Belgian company shall have the furnishing of said materials; but if said company is unable to supply under the above-mentioned conditions, the Chinese Railway Co. will make its purchase where it likes; the Belgian company shall in no way prevent it so doing.

As to the materials which can not be divided in accordance with paragraph 2 of the present article (50 per cent maximum asked for), if the Belgian company agrees to furnish at perfect equality of conditions as to quality, price, and carriage with those secured by the Chinese Railway Co., the furnishing shall be granted the Belgian company; in the contrary case, the Chinese Railway Co. will buy where it chooses; the Belgian company shall in no way prevent it so doing.

The Chinese Railway Co. reserves to itself the right to use all means it may deem good to inform itself as to the best prices for supplying all its materials without the Belgian company interfering in any way with its inquiries.

Arr. 12. As a premium, the Chinese Railway Co. will pay the Belgian company a sum of 5 per cent on the net value, less the cost of transportation, insurance, etc., on all materials bought abroad. The materials for the branch from Lukowkiao to Paoting is not subject to the premium provided for in the present article because nearly the whole amount of said materials has already been bought.

Arr. 13. The taking over of material bought in Belgium will be in the factories making it and by a commission consisting of a delegate of the Chinese Railway Co. and of a delegate of the Société Financière et Industrielle Belge en Chine; in case of disagreement, these two delegates shall choose an umpire to decide the question. The expenses of the delegates shall be borne by the company designating them. The expenses of the umpire shall be borne by the losing party.

Arr. 14. The Société Financière et Industrielle Belge en Chine and its chosen agent shall deal with no other persons or accept any other authority than the Chinese Railway Co. The latter, on its side, shall only recognize the Société Financière et Industrielle Belge en Chine, established at Brussels, in 1897, to the exclusion of every other company.

During the life of the present contract the Belgian company shall in no wise be managed by manufacturers or subjects of other countries, and the Belgian company shall not be at liberty to transfer this contract to any other country, nor to the subjects of another country.

Arr. 15. If the provisions set forth in the present convention are regularly adhered to by the Chinese Railway Co., the Société Financière et Industrielle Belge en Chine agrees, in case of necessity, to study means, in conjunction with the said company, to secure to it special facilities for extending the terms of paying of the annuities and interest.

In case extensions are granted, the amounts which should have been refunded shall bear the same interest as that provided for the loan in the present convention.

If the Chinese Railway Co. wishes to refund the whole loan before the date on which it falls due, it will be at liberty to do so and the interest will cease from the day of such refunding, and the contract shall be declared void from that day.

Arr. 16. All the above provisions are agreed upon in the provisional contract made this day; this provisional convention is signed by the director general of the Chinese Railway Co. on the one part, and stamped with his seal, and, on the other part, by the two representatives of the Société Financière et Industrielle Belge en Chine, and viséed for authentication by the consul of Belgium at Hankow.

Within two months from the date of signing of the provisional contract, the Chinese Railway Co. and the Société Financière et Industrielle Belge en Chine will sign again so as to confirm the provisional contract which shall then become final.

These formalities complied with, the contract shall receive the seals of Their Excellencies the Viceroys of Pechihli and of Hukuang, and also that of His Excellency the Minister of Belgium, at Peking.

Arr. 17. The present contract has been drawn up in the French and Chinese languages; when necessity arises for consulting the contract, the two texts, absolutely identical, shall both be authoritative.

Done at Wuchang, May 27, 1897.

The Chinese Railway Co. being represented by His Excellency Sheng-Hsuan-Huai, its director general.

The Société Financière et Industrielle Belge en Chine being represented by MM. Masy and Rizzardi.

ADDITIONAL PROTOCOL TO THE CONTRACT RELATING TO THE LOAN FOR £4,500,000 FOR THE RAILWAY FROM LUKOWKIAO TO HANKOW.

A provisional contract was made at Wuchang May 27, 1897 (twenty-sixth day, fourth month, twenty-third year of the present reign), relating to the loan for the railway from Lukowkiao to Hankow, between the General Co. of Chinese Railways, established by imperial decree of October 20, 1896 (fourteenth day, ninth month, twenty-second year of the present reign), to which was granted, by the same decree, the concession for the said line, of the first part, and the Belgian company, established by authentic act dated March 3, 1897, published in the *Moniteur Belge* (official newspaper) of March 22 and 23, 1897, of the second part.

This contract was authorized by imperial decree of May 25, 1897 (twenty-fourth day, fourth month, twenty-third year of the present reign). The decree of that date will be communicated to His Excellency the Minister of Belgium at Peking through the Tsung Li Yamén.

The Chinese Railway Co., represented by His Excellency Sheng, its director general, duly authorized for that purpose by the above-mentioned decree, and the Belgian company, represented by M. Alexis Dufourny, chief engineer, director of the Ponts et Chaussées at Brussels, and by M. Edouard Walin, first-class engineer of the Ponts et Chaussées, director of the intercommunal waterworks company at Brussels, duly authorized, on their side, by the Belgian company, authority confirmed by a telegram of His Excellency the Belgian Minister at Peking, sign anew, in the name of the interested parties, the provisional contract according to the terms of article 16 of the latter, so as to confirm it and make it final, and agree furthermore on the following:

ARTICLE I. The above-mentioned Belgian company will make a complete study of the line from Hankow to Lukowkiao for the Chinese Railway Co.; it undertakes to make the surveys, leveling, longitudinal and sectional cuts, to make all plans, drafts of masonry works, bridges, buildings, shops, stations, and outhouses of whatever nature, as also the measurements and specifications, all charges for which are included in the forty-hundredths per cent of additional interest mentioned hereafter in article III.

A similar study will be made for the rolling and fixed stock. But in conformity with article 8 of the contract, the drafts and plans shall be successively submitted to the approval of the general director. It is well understood that all these works are to be carefully done, without any omission; they are not to occasion any additional expenses.

Field work for the carrying out of the works must be finished within a year from the date of the conclusion of the last formalities of approval of the contract. They must

be carried out with the necessary activity to permit of the embankment work being begun within six months of the above-mentioned date.

ART. II. The Belgian company surrenders its right to a premium on materials, conferred on it by article 12 of the contract, and therefore said article is considered void.

ART. III. On the other hand, as compensation for the concessions mentioned above in articles I and II, and to guarantee its expenses of organization, mission abroad, and issuing (the loan), inclusive of all disbursements whatsoever relating thereto, and finally its general expenses during the whole time of the loan, the Belgian company shall receive an increase of forty hundredths per cent (four per thousand) on the rate of interest provided for in article 3 of the contract. This additional interest of 4 per thousand will be paid in the same manner as the yearly interest of 4 per cent; consequently the rate of interest of 4 per cent, together with all the general expenses, is raised, in effect, to 4 and 40 per cent (4.40 per cent). No charge whatsoever in excess of this rate of interest shall be asked for.

ART. IV. The payments provided for in article 2 of the contract shall be made into the Belgian Bank at Brussels, designated by the name of "Société Générale pour Favoriser l'Industrie Nationale," and the Chinese Railway Co. will transfer (thereto) the sums paid into the Commercial Bank of China at Shanghai, organized by imperial decree under date of November 12, 1896 (eighth day, tenth month, twenty-second year of the present reign). The payments of interest and annuities will be made in pounds sterling into the above-mentioned Commercial Bank.

ART. V. It is understood that the guaranty of the railway line, referred to in article 5 of the contract, has absolutely priority of rank.

ART. VI. The present protocol shall be stamped with the seal of Their Excellencies the Viceroy of Chihli and of Hukuang, and also with that of His Excellency the Minister of Belgium at Peking.

The present protocol has been made out in four copies in the French and Chinese languages; both versions are equally authoritative.

Done at Shanghai, July 21, 1897.

For the Chinese Railway Co.

The Director General,
SHENG.

For the Belgian Company,

The first class Engineer of Ponts et Chaussées,
Director of the Intercommunal Waterworks Co.,

WALIN.

The Chief Engineer, Director of Ponts et Chaussées,

DUFOURNY.

LOAN CONTRACT.

Between the undersigned:

1. Their Excellencies the Viceroy of Chihli and of Hupeh, acting in virtue of full powers from the Imperial Chinese Government, duly authorized by decree of His Majesty the Emperor of China, under date of October 20, 1896, of which communication has been officially made to the representatives of Belgium at Peking, by dispatch of the Tsung Li Yamén, under date of —;

2. The Imperial Government of China, represented by His Excellency Sheng Hsüan-huai, director general of the Chinese Railway Co.;

3. The Chinese Railway Co., represented by His Excellency Sheng Hsüan-huai, its director general;

And the Société d'Étude de Chemins de fer en Chine, represented by M. Eugène Hubert, engineer,

Has been agreed the following:

ARTICLE 1. The Imperial Chinese Government has, in compliance with a decree dated October 20, 1896, of which copy is annexed to the present contract, granted the concession of the line from Lukowkiao (Peking) to Hankow (about 1,300 kilometers) to the Chinese Railway Co., which has assets amounting to 13,000,000 taels.

An edict of His Majesty the Emperor of China has authorized Their Excellencies the Viceroy of Chihli and of Hupeh and His Excellency Sheng Hsüan-huai, director general of Chinese railways, to contract, in the name and on account of the Imperial Chinese Government, a loan the product of which is destined exclusively to the building of the above-mentioned line.

This edict, bearing date of October 20, 1896, and of which a copy is annexed to the present contract, is worded as follows:

"Edict of His Majesty the Emperor of China:

"In response to a request of Their Excellencies the Viceroy of Chihli and of Hukuang, presented to His Majesty the Emperor of China, an imperial edict, bearing

date of this day, authorizes the organizing of a railway company and grants it the concession of the line from Lukowkiao (Peking) to Hankow. His Majesty the Emperor authorizes the railway company to contract abroad a loan, the product of which shall be devoted in full to the building of said line.

"His Excellency Sheng Hsüan-huai, undersecretary of State, is appointed director general of this new company.

"Peking, October 20, 1896."

In compliance with the terms of this edict, the Imperial Chinese Government, represented by Their Excellencies the Viceroy of Chihli and of Hupeh and the Director General of Chinese Railways, has decided to contract a State 5 per cent foreign gold loan, of a nominal value of 112,500,000 francs (or 4,500,000 pounds sterling).

This loan shall be known as the Chinese 5 per cent 1898 Loan.

ART. 2. This loan will be represented by 225,000 bonds of 500 francs gold.

These bonds, the text of which is annexed to the present contract, shall be signed in the name of the Imperial Chinese Government by the Viceroy of Chihli and of Hupeh and by the director general of the Chinese Railway Co.

They shall be issued in blocks of one to five bonds, in the proportion to be indicated by the Société d'Étude de Chemins de fer en Chine and are to be manufactured at its expense.

They shall bear 5 per cent interest annually on the par value payable in gold.

Interest shall accrue from the date of the payments and shall be payable September 1 and March 1 of each year.

The first coupon is payable in gold at — francs.

ART. 3. The loan shall be extinguished in 20 years, from the year 1909, by yearly drawings by lot (tirages au sort), which will take place at Brussels, in the offices of the Société Générale pour Favoriser l'Industrie Nationale, in conformity with the table annexed to the present.

The drawings shall take place the second Tuesday of January each year; the first drawing shall take place on that date in 1909.

The numbers of the bonds drawn shall be published in four newspapers at the expense of the Société d'Étude des Chemins de fer en Chine.

ART. 4. The bonds drawn shall be refunded in gold at their par value on the date on which falls due the next coupon.

The bonds presented for reimbursement must have attached to them all the coupons remaining unpaid, and the amount of missing coupons will be deducted from the capital to be refunded.

Interest on bonds ceases to accrue from the date set for reimbursement.

ART. 5. The Imperial Chinese Government denies itself the right before September 1, 1907, to increase the amortization, to pay off the whole loan, or to make a conversion of it. After that date it shall be at liberty to pay off the loan at any time before the terms of payment, and once the refunding made, the contract shall be declared annulled.

ART. 6. The coupons and the bonds ("titres") redeemed ("amortis") shall be payable in francs, in Europe in the office or offices designated by the Société d'Étude and entrusted by it with the management of the loan.

ART. 7. Payment of interest and refunding of bonds of the present loan are guaranteed by the gross revenues of the Imperial Chinese Government.

Furthermore, in virtue of an authorization already granted by the Chinese Government, and in agreement with it, the Chinese Railway Co. declares that it specially assigns, preferentially for the payment of interest and capital of the present loan, and consequently cedes and delegates in favor of said bonds all the net revenue of the line from Lukowkiao (Peking) to Hankow, after the regular payment of all expenses of administration and operation, the whole, as is furthermore set forth in a treaty for operating (the line) concluded between the Chinese Railway Co. and the Société d'Étude de Chemins de fer en Chine, treaty hereto annexed and forming an integral part of this contract.

This assignment ("affectation") is made exclusively and irrevocably until complete refunding of the bonds of the present loan.

ART. 8. The Chinese Railway Co. directs the Société d'Étude to deposit the funds from the net revenue of the traffic with the Société Générale pour Favoriser l'Industrie Nationale, established at Brussels, or with the company designated by it.

This latter shall convert into gold, and to the best interest of the Imperial Chinese Government and the Chinese Railway Co., and up to the full amount of the sum

¹ See, however, loan agreement of Oct. 8, 1908, and Imperial edicts of Oct. 6 and 8, 1908. The Chinese Government took control of the Peking-Hankow Railway from Jan. 1, 1909.

necessary to insure the service of the loan at the following semiannual payment, the deposits made with it by the Société d'Etude empowered by the Chinese Railway Co. to make them.

These deposits by the Société d'Etude with the Société Générale Belge or the company designated by it shall continue to be made until the sum necessary for the full service of the loan at the date of the next semiannual payment has been completed in gold, and in such manner that said service is insured three months at least before said semiannual payment falls due. The depositories shall utilize these sums in the manner the most advantageous for the Chinese company.

The account on which these sums are borne shall be charged 20 days before date of semiannual payment with the sum necessary for the service of the loan, interest, amortization, expenses, and commissions.

ART. 9. The bank having received in deposit the funds shall have the right to take, without new authorization, from such funds on deposit, the amount of the coupons to be paid during the period of construction.

ART. 10. So as to insure the guaranty just mentioned for the bonds of the present contract, the Chinese Railway Co. recognizes for these bonds a prior special lien on the railway from Lukowkiao (Peking) to Hankow: line, stationary and rolling stock, and receipts.

This special assignment is accepted in the name of the bondholders by the Société d'Etude. In case of nonexecution of the obligations assumed by the Chinese Railway Co. in the present contract, the Société d'Etude or the Belgian company designated by it, shall have full power to enjoy as to said property all the rights and powers resulting from said special assignment.

ART. 11. The preceding provisions do not relieve the Imperial Chinese Government from personal responsibility relative to the present loan, as this responsibility is specified in article 7.

Consequently, the Imperial Chinese Government agrees to make up the necessary amount for the service, in gold, of the loan, in case the sums accruing from the net proceeds of the line from Lukowkiao (Peking) to Hankow, and paid by the Société d'Etude, entrusted with this service by the Chinese Railway Co., to the Société Générale Belge, or to the company which it may designate, should not have reached, after their conversion in gold, and at least three months before the following semiannual payment, the amount sufficient to cover said service.

In this case, and upon the request made it, the Imperial Chinese Government must hold at the disposal of the Société Générale Belge or of the company designated by it 60 days before the next semiannual payment, gold or securities deemed sufficient to realize the amount in gold, which the company shall have notified the Government is necessary to complete the payment.

ART. 12. Out of the sums coming from the payments made by the Société d'Etude or the payments made by the Imperial Chinese Government, the Société Générale Belge or the company designated by it, shall in due time place at the disposal of the firms entrusted with the service of the loan, the necessary amounts, according to the needs as ascertained during the preceding half year.

ART. 13. The Imperial Chinese Government will pay to the firms entrusted with the service of the loan, a commission of $\frac{1}{4}$ per cent on the amount of paid coupons and a commission of $\frac{1}{4}$ per cent on the amount of the bonds drawn or redeemed by anticipated reimbursement. The amount of this allowance shall be deducted every six months from the surplus of the available exploitation receipts, and, in case of insufficiency, it shall be immediately paid by the Imperial Chinese Government.

ART. 14. The Imperial Chinese Government binds itself by the present conventions to observe and cause to be observed the privilege stipulated in favor of the bonds in article 9, and to maintain, free and exempt from all tax whatsoever, the bonds and coupons, as well as all transactions of whatsoever nature connected with the service of the loan.

ART. 15. Coupons which shall not have been presented for cashing within five years following their falling due, shall revert to the Imperial Chinese Government; 30 years shall be the limit for redeemed bonds.

On the death of any bondholder of the present loan, the bonds shall be transferred and shall belong to his heirs, according to the inheritance laws in force in the country of which the deceased bondholder was citizen.

Payments of coupons and the redemption of bonds shall be made in time of war, as in time of peace, to the bearers whether they be subjects of friendly or hostile States.

In case of loss, of theft, or destruction of bonds of the present loan, the Chinese Government shall replace them, after having been furnished satisfactory proof of their loss or of the destruction of the title deeds and of the rights of the claimants.

ART. 16. The Imperial Chinese Government through its representatives in Europe shall immediately take the necessary steps and furnish the necessary documents for the official listing of the present loan in the bourses of Brussels and Paris.

ART. 17. Out of the total amount of the present loan, representing as nominal capital a sum of 112,500,000 francs, the Société d'Etude de Chemins de fer en Chine purchases outright ("achete ferme") 39,000,000 francs of nominal capital, or 78,000 bonds of 500 francs, at 90 per cent for the total sum of 35,100,000 francs, delivery to date from the payment to the banks designated in the following article:

ART. 18. The Société d'Etude de Chemins de fer en Chine shall deposit the amount of this purchase, as follows: 8,600,000 francs in the Russo-Chinese Bank at Shanghai, and the remainder in a bank designated by common accord by the director general of the Chinese Railway Co. and the Société d'Etude and against receipt by the Russo-Chinese Bank in Paris of definite bonds for 78,000 bonds bought outright ("achetés ferme") and deposit in the same bank of the definitive bonds for 147,000 bonds forming the surplus of the loan.

The Russo-Chinese Bank and the bank designated by common accord by the Chinese Railway Co. and the Société d'Etude shall credit the Chinese Railway Co. with the sums deposited with them, it being understood that these depository establishments shall not be obliged to deliver these sums, except under the conditions and under the reservations indicated in undermentioned article 20.

The depository banks shall use these sums to the best advantage of the Chinese Railway Co.

ART. 19. The Chinese Railway Co. declares that it has resources amounting to 13,000,000 taels.

The construction of the railroad from Lukowkiao (Peking) to Hankow being limited provisionally to the section from Lukowkiao (Peking) to Paoting (145 kilometers) and to the Hankow-Sinyang section (247 kilometers) which must be constructed first; it is understood that the 13,000,000 taels above mentioned shall in the first place be applied to the construction and to putting in complete working order of the Lukowkiao-Paoting section.

The construction of the entire line (not including the Peking-Paoting section) shall be done under the direction of the Société d'Etude de Chemins de Fer en Chine or its representatives, but for the account of the Chinese Railway Co.

The Société d'Etude shall make the studies, plans, surveys, estimates for the whole line, direct the execution of all the work and order the materials, machinery, and furniture necessary to insure the regular operation of the line. However, the director general of the Chinese Railway Co. reserves to himself the right to approve the building plans and contracts for supplies.

Except for supplies of materials and expenses of all kinds paid in Europe, the Chinese Railway Co. must place at the disposal of the Société d'Etude the necessary sums for settling all payments without exception necessitated in the carrying out of the work, as well as the payment of the staff under the orders of the Société d'Etude and, in general, all expenses whatsoever.

Consequently, the Société (d'Etude) shall not be obliged to pay any expenses from its own funds.

It shall endeavor to complete the construction of the line within three years.

ART. 20. On the Hankow-Sinyang section and eventually on the other sections between Paoting and Sinyang, the Russo-Chinese Bank in the first place and afterwards the bank designated by common accord by the Chinese Railway Co. and the Société d'Etude, shall deposit each month with the Chinese Railway Co., out of the available funds in their hands, the amounts necessary to settle the payments for the ensuing month, according to the estimates prepared by the Société d'Etude or its delegates.

A first transfer equivalent to the estimated value of the work already executed on the Hankow-Sinyang section shall be made as a first credit.

The price paid for the above-mentioned bonds being exclusively affected to the construction of the line from Hankow to Paoting, the Russo-Chinese Bank and the bank referred to in the first paragraph of the present article, would have the right not to pay the funds in case one of their payments were diverted from the purpose stipulated, as well as in case the representatives of the Société d'Etude were not empowered by the Chinese Railway Co. to continue the management of the construction works with which this company is exclusively entrusted.

The balance, if there be one, shall be held subject to the order of the Chinese Railway Co.

ART. 21. The Chinese Government cedes to the Société d'Etude an option till December 31, 1901, to purchase the surplus of the loan, to wit: 73,500,000 francs at 90 per cent nominal, plus the accrued fraction due on the coupon.

This option can be availed of one or several times, without regard to the amortizations made, but each notice must be for a sum not less than 25,000,000 francs net.

The delivery of the bonds taken on the options shall be to the Russo-Chinese Bank in Paris; the final bonds shall be delivered within a month dating from the telegraphic notification to the management of the Chinese Railway Co.

The price of these bonds shall be deposited in the bank designated, by common accord, by the Chinese Railway Co. and the Société d'Etude, and it shall not surrender them except under the conditions stipulated in the above article 20.

ART. 22. If the Société d'Etude takes advantage of the right granted it to purchase all or part of the bonds on which it holds an option, it shall each time confer with the Chinese Railway Co. to determine upon the sections (of line) to be built with its new funds.

ART. 23. The surveys of the line, dating from the signing of the present contract, are to be made at the expense of the Chinese Railway Co.; the Hankow-Sinyang sections shall first be surveyed, and then successively each of the other sections, for building which an agreement may be had before the Société d'Etude avails itself of the right of option conceded it by article 21.

It is henceforth understood that the section to be built with the funds derived from the first option shall be the one from Paoting toward the Yellow River, and the survey shall be begun during the first year.

ART. 24. La Société d'Etude reserves the right to make one or more issues by public subscription or otherwise, of all or any part of the bonds whether bought outright ("achetés ferme") or included in the option.

Should the issue be by public subscription, the Société d'Etude shall have the right to include in the total offered for subscription, exclusive of the 78,000 bonds taken outright ("prises ferme"), all or any part of the bonds covered by the option, without on that account being committed to take outright ("prendre ferme") any part whatever of the bonds covered by the options.

It shall be allowed 15 days, counting from the closing of the public subscription, to inform by registered telegram addressed to His Excellency Sheng, director general of the Chinese Railway Co. at Shanghai, the number of bonds it has taken, and that at the price and under the conditions above specified.

The payment and the delivery of the bonds taken by the Société d'Etude following the public subscription shall take place under the conditions specified in the above-mentioned articles.

ART. 25. The present contract shall only be binding on the Société d'Etude inasmuch as it shall have the promise that, with the exception of what can be supplied by the Hanyang works, all the materials and supplies necessary for the construction and working of the railroad from Lukowkiao (Peking) to Hankow will be ordered from the Société d'Etude, which will fill the orders under the best possible terms.

Exception is made for the material necessary for the equipment ("armement") of the line from Lukowkiao to Paoting, as this material is almost entirely ready.

Compliance with the provisions of this clause by the Chinese Railway Co. shall result from the ordering of material for each of the sections undertaken.

Material ordered from the Société d'Etude shall be exempt from all customs and likin duties on entering or crossing Chinese territory.

If this franchise is not made good before the expiration of the month following the date on which the Belgian Government shall have notified the Société Belge of the receipt of the notifications stipulated in article 29, it (the Société d'Etude) reserves the right not to hold itself bound.

It reserves the same right and within the same time if extraordinary events should arise, as for instance war, or if the French debt ("rente française") should fall below par.

If, on its side, the Société Belge should not keep the terms of the present contract, it shall be annulled; the Chinese Railway Co. shall be free to enter into contract with whomsoever it may see fit, and to dispense with the services of the engineer in chief.

ART. 26. In case of controversies or differences between the Société d'Etude or its representatives and the Imperial Chinese Government or the Chinese Railway Co., these controversies or differences shall be submitted to the judgment of a member of the Tsung Li Yamèn and the Belgian Minister in China.

In case of disagreement between these latter, the Tsung Li Yamèn and the Belgian Minister shall designate an arbitrator who shall decide finally.

ART. 27. As guaranty for the financial execution of the present contract, the Société d'Etude has already deposited in the Russo-Chinese Bank £20,000 as security.

It shall take full possession of this sum as soon as it shall have fulfilled the provisions stipulated in the first two paragraphs of article 18 here above.

It is understood that the payment of 8,600,000 francs to the Russo-Chinese Bank at Shanghai must be made within the month following the date of the signing of the present contract.

ART. 28. The Tsung Li Yamèn shall be bound in case the Belgian Minister at Peking request it to give cognizance of the title to the minister of the foreign country, indicated by him, as subscriber to the issue of stock.^a

ART. 29. The present contract is made in triplicate, one copy for the Chinese Government, one for the Chinese Railway Co., and the third for the Société d'Etude de Chemins de Fer en Chine.

In case of doubt or disagreement, the French text alone shall be used to interpret the contract.

The present contract must be submitted through the proper channel for imperial sanction, and when said sanction has been obtained, the Tsung Li Yamèn must advise the Belgian representative at Peking by official dispatch and eventually the representative in Peking of the foreign country to whom it may give cognizance of the title ("le représentant à Peking du pays étranger auquel le titre sera notifié"). These formalities shall be complied with within the month following the signing of the contract. The provisions of the contract signed at Wuchang May 27, 1897, and of the protocol signed July 21, 1897, which do not conflict with the present contract, especially those of article 14 of the Wuchang contract and article 2 of the Shanghai protocol, are and remain in force. The Société Générale of Brussels and the Russo-Chinese Bank are parties to the present contract, and they, after having examined the preceding contract, declare that they, as far as necessary, accept the duties imposed. According to article 14 of the above-mentioned Wuchang contract, the Chinese Railway Co. will only recognize the Société Belge as contracting party.

Done at Shanghai, the twenty-sixth day of the month of June, one thousand eight hundred ninety-eight.

*The Engineer representing the Société d'Etude de Chemins de fer en Chine,
The Director General of the Chinese
Railway Company.*

*The Representatives of the Imperial Chinese Government:
The Viceroy of Hupeh, The Viceroy of Chihli.*

OPERATING CONTRACT.

Between the undersigned:

1. The Imperial Chinese Government, represented by Their Excellencies, the Viceroys of Chihli and of Hupeh;

2. The Chinese Railway Co., represented by His Excellency Sheng Hsüan-huai, its director general, office of the company at Shanghai;
And the Société d'Etude de Chemins de Fer en Chine, whose office is at Brussels, Has been agreed as follows:

ART. 1. The Chinese Railway Co., in accord with the Imperial Chinese Government, entrusts the Société d'Etude de Chemins de Fer en Chine, which shall appoint representatives for that purpose, with the direction, administration, and operating of the line from Hankow to Lukowkiao (Peking), for which it holds a concession, under the terms of an edict of His Majesty the Emperor of China dated October 20, 1896, and of which a copy is annexed to the present contract.

ART. 2. The Société d'Etude shall take over the working of the line as soon as each section is completed, following final acceptance by the Imperial Administration of Chinese Railways. Each section must be completely and previously equipped and provided with all the material necessary for its working, as well as with the supplies of tools, furniture, and a fund for running expenses. The Société d'Etude or the representatives it shall appoint under the provisions of article 1, shall organize the various services, shall have the right to hire the personnel, which it shall have absolute right to dismiss, or disband, and to fix its salaries according to a fixed schedule previously communicated to the director general of the Chinese Railway Co. It shall make all purchases necessary for operating, maintaining, or repairing the road; it shall fix the schedule of rates in the terms of concession contracts, collect revenues of all kinds, and pay the operating and management expenses of the company. The foregoing measures, taken for the purpose of operating the line, shall be submitted, for consultative purposes, to the director general of Chinese Railways.

The Chinese Railway Co., which will appoint delegates for that purpose, shall have absolute right of control over the receipts and expenses.

The purchase of all new material or works for the improvement or extension of the regular road, or of stations, which may be found necessary after the opening of each

^a Si le Ministre de Belgique à Pékin en faisait la demande au Tsung Li Yamèn, celui-ci, s'en serait tenu de notifier le titre au Ministre du pays étranger qu'il lui désignerait, comme prenant part à la souscription des titres.

section of the line to traffic, shall be at the sole expense of the Chinese Railway Co. As far as possible the supplies necessary for the maintenance and repairing of the road shall be ordered from the works and mines under the control of the director general of the Chinese Railway Co.

ART. 3. In case of war or revolution in China, the transportation of troops, munitions, and of the supplies of the Chinese army shall have right of way over all commercial transportation. The rate for such transportation shall be 50 per cent of the tariff; and it shall be carried according to the instructions of the director general of the Chinese Railway Co. The transportation of anything of a nature to injure the Imperial Chinese Government shall, moreover, be forbidden.

ART. 4. Out of the receipts from operation available, after payment of all expenses, the Société d'Etude shall retain the necessary sum to insure the payment, every six months, and at least three months before its date of payment, of the service of the loan of 112,500,000 francs contracted by the Imperial Chinese Government.

This reserve shall be made as long as said loan is not entirely paid off.

The amount of this reserve shall be deposited monthly with the Société Générale Belge pour favoriser l'Industrie Nationale, or with the company designated by it. The latter shall convert into gold on the best terms procurable the sums paid to it for the service of the loan.

When, by means of the sums thus paid in, the service in gold of the loan shall have been insured, the Société d'Etude shall deduct 10 per cent of the surplus, which shall be applied to the creation of a reserve fund for rebuilding or making extraordinary repairs necessary to insure the working of the lines.

It shall then pay the balance remaining available out of the operating revenues to the Chinese Railway Co.

ART. 5. The duration of the present operating contract is fixed at 30 years dating from the signing of the contract.

However, this period would be fully entitled to extension in case the loan of 112,500,000 francs should not at that time be wholly paid off; this extension would continue as long as the complete amortization had not been made. But if the refunding of the loan should be made before the dates on which they fall due, the present working contract will be annulled from the date of the total refunding of the loan.

ART. 6. During the entire period of the working of the line by the Société Belge, the Chinese Railway Co. grants it 20 per cent of the net profits of the railroad from Peking to Hankow, as agreed upon by mutual consent, after the closing of each fiscal term ("exercice"), taking into account, naturally, the sums necessary for the service of the interest and the amortization of the loans.

ART. 7. In case of contentions or disagreement between the Société d'Etude and the management of the Chinese Railway or the Imperial Chinese Government, said contentions and disagreements shall be settled as specified in article 26 of the loan contract.

ART. 8. If the revenues from operating the lines are not sufficient to cover the expenses, the Chinese Railway Co. must supply the Société d'Etude with the necessary means to insure the operating of the lines under normal conditions.

ART. 9. All materials and supplies needed by the Société d'Etude for the working of the line, as well as for the maintenance and repair of the line, shall, when imported from abroad, be exempt from all customs or likin dues.

ART. 10. The present contract is made in triplicate; one copy for the Imperial Chinese Government, one for the Chinese Railway Co., and the third for the Société d'Etude de Chemins de Fer en Chine.

In case of doubt or disagreement the French text shall alone be accepted for the interpretation of the contract.

The present contract must be submitted through the proper channel for imperial sanction, and, when said sanction shall have been obtained, the Tsung Li Yamén must advise, by official dispatch, the Belgian representative at Peking and eventually the representative at Peking of the foreign government to which the title may be officially notified ("auquel le titre sera notifié").

Done in Shanghai, the twenty-sixth of the month of June, eighteen hundred ninety-eight.

The Engineer representing the Société d'Etude de Chemins de fer en Chine.

*HUBERT.
The Director-General of the Chinese Railway Co.*

SHENG-HSUAN-HUAL.

Witnesses:

Seen for authentication:

*FRÈRE,
Belgian Consul.*

The Representatives of the Imperial Chinese Government:

The Viceroy of Hupeh,

*Hu.
Ko.*

The Viceroy of Chûli.

CONTRACT FOR THE SUPPLEMENTARY LOAN FOR THE PURPOSE OF COMPLETING THE LINE FROM PEKING TO HANKOW, AUGUST 13, 1905.

[Translation from French text as printed in Wang's "Railway Loan Agreements," p. 73.]

Between the undersigned:

First. The Imperial Chinese Railway Co. represented by His Excellency Sheng Hsuan-huai Kung Pao, director general, duly authorized by the Chinese Government,

Second. The Société d'Etude de Chemins de Fer en Chine, represented by M. Jean Jadot, engineer in chief, director of the line from Peking to Hankow, holding full powers,

It has been agreed as follows:

ARTICLE I. To assure the completion in good time of the line from Peking to Hankow and of its branches, and also to assure the payment of interest on the loan, until the whole line has been put into operation, the two contracting parties have decided to issue a supplementary 5 per cent gold loan, at the issue price of 90 per cent, to the nominal amount of 12,500,000 francs, represented by 25,000 bonds of 500 francs each.

ART. II. This loan is subject to all the clauses and conditions of the principal 5 per cent loan contract, under date of June 26, 1898, and of the operating contract annexed thereto, especially as regards the rate of interest, period, amortization, etc.

ART. III. This loan, like the principal loan, has the guaranty of the Chinese Government; and it has, furthermore, as a special guaranty, the net revenue from the operation of the Peking-Hankow line, including the extension from Lukowkiao to Peking, and the branches forming part of the same system, after deduction of the sums necessary to assure the services of the principal loan of 1898.

ART. IV. The purpose of the present supplementary loan being to assure the completion of the whole line, every effort will be made to avoid exceeding it. If, however, after the completion of the line toward the close of 1905, besides the ordinary expenses of upkeep and current repairs, and besides the service of the loan and the deduction of 10 per cent for rebuilding or extraordinary repairs (according to article IV of the operating contract)—expenses which will be covered by the operating revenues—there are expenses to be incurred for the final work or orders for new material, or any extension works whatsoever—expenses which (according to article II of the operating contract, and according to the rules generally adopted in railway business) should be charged to the capital account—these expenses will be covered by that share of the net profits which should accrue to the Imperial Chinese Railway Co.; if that share should not suffice to cover these expenses, the Imperial Chinese Railway Co. should, of course, in conformity with the operating contract, furnish the funds to cover them.

These expenses can only be incurred after a previous agreement with the director general or his delegate.

ART. V. After the completion of the whole line the operating service will become more and more important. The Imperial Chinese Railway Co. has named a delegate who (in conformity with article II of the operating contract) should examine in advance, with the delegate of the Société d'Etude de Chemins de Fer en Chine, all measures for the purpose of assuring the perfect organization of the various services and see to the proper execution of those measures, the Société d'Etude de Chemins de Fer en Chine being charged by the Chinese Government with the operation of the line, by virtue of the operating contract.

ART. VI. If, in the future, the construction of new branches is decided upon, the Imperial Chinese Railway Co. must furnish the necessary funds, either by means of its share of the net profits, or otherwise. The Imperial Chinese Railway Co. will be free to choose such means as it sees fit.

ART. VII. The present contract is drawn up in four copies, one of them for the Chinese Government, one for the Imperial Chinese Railway Co., one for the legation of Belgium in Peking, and one for the Société d'Etude de Chemins de Fer en Chine.

In case of doubt or difference, the French text alone will be authoritative for the interpretation of the contract.

ART. VIII. When the contract shall have received imperial sanction, the Ministry of Foreign Affairs (Waiwupu) will give instructions by telegraph to His Excellency the Minister of China, in Brussels, for the signature of the 25,000 bonds for the loan, in the name of the Chinese Government.

Notice of the imperial sanction and of the instructions given to the Chinese minister at Brussels will be given by the Waiwupu to the minister of Belgium in Peking.

If the minister of Belgium requests it of the Waiwupu, the latter will advise the minister of such foreign country as may be designated to him as taking a part in the subscription for the bonds.

Done at Peking, August thirteenth, nineteen hundred and five.

*J. JADOT.
SHENG.*

Appendix 4.—PEKING-NEWCHWANG RAILWAY.

PRELIMINARY AGREEMENT BETWEEN THE HONGKONG & SHANGHAI BANKING CORPORATION AND DIRECTOR GENERAL HU, RESPECTING THE PEKING-NEWCHWANG RAILWAY LOAN.

This is a preliminary agreement made between His Excellency Hu, Governor of Peking and administrator general of the Imperial Railways of North China within and without the Great Wall, hereinafter called the administrator general, of the one part, and the Hongkong & Shanghai Banking Corporation, representing a British syndicate, hereinafter called the syndicate, of the other part.

1. The syndicate is hereby authorized by the administrator general to make arrangements to float and issue, on behalf of the Railway Administration, on the best terms obtainable on the market, a sterling loan for the equivalent of about 16,000,000 taels, for the construction of a railway line from Chunghousou to Hsinmingtien, and a branch line to Yingtzu, and for the redemption of existing loans to the Tientsin-Shanhaikwan and Tientsin-Lukowkiao lines.

2. The security for the loan shall be the permanent way, rolling stock, and entire property, together with the freight and earnings of the existing lines between Peking, Tientsin, Tangku, and Chunghousou, and also of the proposed new lines when constructed, in addition to the rights of mining coal and iron, which will be retained by the Railway Administration on each side of the proposed new lines, for a distance to be determined. In the event of default or arrears in payment of interest or payments of principal, the said railway lines and mines shall be handed over to representatives deputed by the syndicate, to manage them on their behalf, until principal and interest of the loan are redeemed in full, when the management will revert to the Railway Administration.

It will, however, be provided that if such arrears are for a small sum, and it appears desirable to the syndicate to extend the due date of their payment for a term not exceeding three months, it shall be open to the syndicate to do so.

In the event of any special circumstances arising, necessitating the introduction of important changes by the management aforesaid, these changes shall be effected in consultation with the administrator general, and in the best interests of the railway. In the case of war or famine, troops and grain will be transported over the line on terms to be arranged hereafter.

No further loan, charge, or mortgage shall be charged on the security named above until this loan is redeemed.

3. During the currency of the loan the principal members of the railway staff shall be capable and experienced Europeans, who shall be, as at present, appointed by the administrator general of the railway, and may be, in the event of their misconduct or incompetency, dismissed, after consultation with the chief engineer. If there are Chinese with sufficient engineering or traffic experience, they may be appointed as well as Europeans. Should it be necessary to appoint a new chief engineer, such appointment shall be made in consultation with the syndicate.

In addition to above, a capable and experienced European railway accountant shall be appointed to inspect all the accounts of the railways.

All receipts and earnings of the lines herein specified shall be paid in to the credit of the Railway Administration with the Hongkong & Shanghai Banking Corporation, Tientsin, together with 50,000 taels annually payable under the Board of Revenue arrangement, approved by the Throne, by each of the Provinces of Shansi, Shensi, Honan, and Anhwei, for the railway purposes for 10 years.

All expenses of repairing and maintaining lines will be paid from this account, the remainder of which shall then be charged with the service of this loan.

4. The rate of interest, price, term of years, and other particulars shall be left to the syndicate to arrange, on the best terms possible, on the market, when the moment appears favorable for floating the loan. Installments of proceeds will be arranged as far as possible to suit the progress of construction and the requirements of the administrator general, interest being calculated from the date of such payments. The loan will be redeemable by the annual drawings to be scheduled in the final agreement. Besides the drawings so scheduled the administrator general may from

time to time, on giving due notification to the syndicate, call for extra drawings to be held, bonds so drawn being redeemed by the Railway Administration at 20 per cent premium on their par value.

5. If it shall be found that the loan can not be floated without the introduction of some special attraction, the administrator general shall memorialize the Throne, recommending that a concession of mining rights be granted to the syndicate at a point or points on the lines, and on terms to be arranged with the syndicate on the basis of the mining regulations newly established by the Tsung Li Yamen. The requests of the syndicate will be confined to mines within a distance of 5 li of the railway.

6. The date of issue of this loan shall be left to the discretion of the syndicate, to be fixed in accordance with the state of the market, but should it be found impossible to issue it before the 1st day of October next, the syndicate will arrange to advance to the administrator general, on or about that date, an installment of about 2,000,000 taels on account of and repayable out of the proceeds of the loan when floated. The terms of this advance shall be left to the arrangement of the syndicate on the best terms obtainable, interest not to exceed the rate of 5½ per cent per annum, and the syndicate shall be authorized to issue temporary bonds for the amount if required.

7. For the satisfaction of the investing public who are unacquainted with China a satisfactory report will be required from the district engineer, Mr. J. Ginnell, as to the condition and earning power of the old lines, and as to the route, prospects, and mineral wealth of the new lines to be constructed, and Mr. Ginnell shall be instructed by the administrator general to proceed to London as soon as possible after the signing of this preliminary agreement, to confer with the syndicate on these matters.

8. The terms of this preliminary agreement will, immediately after signature, be submitted by the administrator general to the Throne for sanction by the imperial edict, which shall be officially communicated by the Tsung Li Yamen to the British minister in Peking.

9. Three months from the date of signature of this preliminary agreement shall be allowed to the syndicate to accept or decline its terms. Upon their confirmation by the syndicate, this preliminary agreement shall be replaced by a definite agreement, providing for all details.

Signed at Peking, this 7th day of June, 1898, being the 19th day of the 4th moon of the 24th year of the Emperor Kuang Hsu.

(Seal of Administrator General of Railways within and without the Shanhaikwan boundary.)

For the Hongkong & Shanghai Banking Corporation.

(Signed.) E. G. HILLIER, Agent.

DEFINITE AGREEMENT BETWEEN THE BRITISH & CHINESE CORPORATION (LTD.) AND DIRECTOR GENERAL HU, RESPECTING THE PEKING-NEWCHWANG RAILWAY LOAN.

This agreement is made between His Excellency Hu, Governor of Peking, as administrator general of the railways of North China within and without Shanhaikwan, acting under the authority of the Imperial Chinese Government, hereinafter called the administrator general, of the one part, and the Hongkong & Shanghai Banking Corporation, for themselves and on behalf of the British firm of Jardine, Matheson & Co., representing as joint agents the British & Chinese Corporation (Ltd.), hereinafter called the corporation, of the other part:

Whereas, on the 7th day of June, 1898, being the 19th day of the 4th month of the 24th year of the Emperor Kuang Hsu, a preliminary agreement was signed at Peking between the administrator general and the Hongkong & Shanghai Banking Corporation, representing a British syndicate, for a sterling loan for the equivalent of about 16,000,000 taels for the construction of a railway from Chunghousou to Hsinmingtien and a branch line to Yingtzu, and for the redemption of existing loans made to the Tientsin-Shanhaikwan and the Tientsin-Lukowkiao Railway lines; and

Whereas, the Hongkong & Shanghai Banking Corporation, before the expiration of the period named, duly notified the administrator general that it is prepared, with certain modifications, to arrange the issue of the loan upon the conditions named in the preliminary agreements:

1. The corporation agrees to issue on behalf of the administrator general a sterling loan for the amount of £2,300,000, the proceeds of which are to be applied in the order following:

(a) To the redemption forthwith or at maturity of the loans and advances specified in the statement attached to this agreement which have been made by foreign banks to the Tientsin-Shanhaikwan and the Tientsin-Lukowkiao Railway lines. The administrator general hereby certifies that the total amount of the liabilities due by the lines named does not exceed the sum of 3,000,000 taels.

(b) To the carrying out, within a period of three years from the date of this agreement, of certain improvements and additions to rolling stock of the existing lines between Peking and Shanhaikwan, recommended by the European chief engineer, and estimated by him to cost about 1,500,000 taels.

(c) To the construction of a railway line from Chunghousou to Hsinmingting, and one from a point on that line near Shihsauchan to Yingtzu, and of a branch line from Nuerhho to the collieries of Nanpiao.

The administrator general engages that the construction of the new lines here specified shall be completed within a period of three years from the date of this agreement.

2. In the event of the proceeds of this loan being insufficient for the completion of the new lines here specified, the administrator general will provide or will arrange with the Imperial Government of China to provide funds from other sources sufficient to complete their construction.

3. This loan shall be a first charge upon the security of the permanent way, rolling stock, and entire property, with the freight and earnings of the existing lines between Peking and Shanhaikwan, and on the freights and earnings of the new lines when constructed. The administrator general shall, during the continuance of this loan, maintain the railway buildings, works, rolling stock, and dependencies in good order and condition, and shall increase the rolling stock from time to time to such extent as shall be necessary for the requirements of traffic.

Should it be decided hereafter to construct branch lines or extensions connecting with the lines herein named, their construction shall be undertaken by the Railway Administration, and should the funds of the Railway Administration be insufficient for that purpose, it shall apply to the corporation for the same.

4. The principal and interest of this loan are guaranteed by the Imperial Government of China, and in the event of default in payment of interest or repayment of principal at due date, the corporation shall immediately notify the Imperial Government of China thereof, and the Imperial Government of China will thereupon provide the funds necessary to meet such payments in sterling in London. In the event of the Imperial Government of China being unable to provide the funds necessary to meeting a payment of interest or principal when called upon by the corporation to do so, in terms of this clause, the said railway lines and entire property shall thereupon be handed over to representatives deputed by the corporation to manage, on their behalf, until principal and interest of the loan have been redeemed in full, when the management will revert to the Railway Administration. It is provided that should arrears of interest or principal be for a small sum, and it appear desirable to the corporation to extend the due date of their payment for a term not exceeding three months, it shall be open to the corporation to do so.

This arrangement, which differs from other contracts in that the administrator general retains control of the railway lines so long as the principal and interest of this loan are regularly paid, has been agreed to in consequence of the friendly relations which have long existed between the contracting parties.

5. No further loan shall be charged upon the security named above, except through the corporation, until the loan is redeemed; and the Tsung Li Yamen will hand to the British minister in Peking a written undertaking on behalf of the Imperial Government of China, that the railway lines named in this agreement shall never be alienated or parted with.

6. During the currency of this loan the chief engineer of the railways shall be a British subject. The principal members of the railway staff shall be capable and experienced Europeans, who shall be, as at present, appointed by the administrator general of the railways, and may be, in the event of their misconduct or incompetency, dismissed after consultation with the chief engineer.

If there are Chinese with sufficient engineering or traffic experience they may be appointed as well as Europeans.

Should it be necessary to appoint a new chief engineer such an appointment shall be made in consultation with the corporation.

In addition to the above, a capable and efficient European railway accountant shall be appointed, with full powers to organize and direct the keeping of the railway accounts, and to act with the administrator general and the chief engineer of the railway in the supervision of receipts and expenditures.

7. The railway lines named in the agreement being Imperial Government lines, in the event of war or famine Chinese Government troops and grain may be transported over the lines free.

8. All receipts and earnings of the lines herein specified shall be paid into the credit of the Railway Administration with the Hongkong & Shanghai Banking Corporation, Tientsin, together with 50,000 taels annually payable, under the Board of Revenue's arrangement approved by the Throne, by each of the Provinces of Shansi, Shensi, Honan, and Anhwei, for railway purposes for 10 years.

All expenses of working and maintaining the lines will be paid from their receipt, and earnings, the remainder of which, together with the provincial funds above named, shall then be charged with the service of this loan. Payments of interest and repayments of principal shall be made in equal monthly installments, and in accordance with the amounts and dates of a yearly schedule which will be furnished to the administrator general by the bank. These payments shall be made by the administrator general to the Hongkong & Shanghai Banking Corporation, Tientsin, in Hongping sycee sufficient to provide the sterling amount due to the bondholders in terms of the prospectus of the loan, the rate of exchange for these payments being fixed by that bank as each such payment becomes due. In reimbursement of expenses incurred in connection with the distribution of the service to bondholders of the principal and interest of the loan, the Hongkong & Shanghai Banking Corporation, Tientsin, shall receive from the Railway Administration a commission of $\frac{1}{2}$ per cent on the annual loan service which will be included in the yearly schedule for the same.

9. The term of the loan shall be 45 years, and subject to the modification mentioned hereinafter, repayment of the principal shall be made, so far as regards the bondholders, in 40 equal annual installments commencing with the sixth year.

10. Interest on the loan shall be charged at the rate of 5 per cent per annum on the nominal principal and shall be calculated on the balance of such principal at any time outstanding, payments of interest being made by the administrator general in accordance with the amounts and dates specified in the yearly schedule to be provided.

11. The loan will be redeemed by annual drawings in London, as provided for in the prospectus. Besides the drawings as provided for, the administrator general may, on giving three months' notice to the corporation, call for extra drawings to be held for any amount. Bonds so drawn to be redeemed by the Railway Administration at 20 per cent premium on their par value. Any such extra drawings must take place on the date of the ordinary drawing provided by the prospectus.

In the event of such extra drawings taking place, subsequent payments of interest will be adjusted in the yearly schedule to be provided, but the repayments of principal shall continue unaltered in terms of clause 9 of this agreement until the loan is redeemed.

The Imperial Government of China hereby engages that this loan shall not be redeemed or converted otherwise than as herein provided.

12. The price agreed upon for this loan is 90 per cent net of the nominal principal, but should an unfavorable state of the market prevail at the time of issuing the prospectus the corporation is hereby authorized to reduce the price of the loan, at its own discretion, to not less than 88 per cent net to the Railway Administration.

13. The corporation is hereby authorized to issue to subscribers to the loan bonds for the total amount of the loan in pounds sterling, in such form and for such amounts as shall appear desirable to the corporation, and the Minister for China in London will seal all such bonds with his official seal, as evidence that the Imperial Government of China is bound thereby. Each such bond shall bear the following clause:

"The Imperial Government of China, pursuant to an imperial edict, dated, unconditionally guarantees and declares itself responsible for the payment of the principal moneys and interest hereby secured, and in faith thereof it has specially authorized the Chinese Minister in London to seal this bond with his official seal."

14. All bonds and coupons and payments made and received in connection with this loan shall be exempt from Chinese taxes and imposts forever.

15. All details necessary for the prospectus and connected with the service to the bondholders on the interest and repayment of principal of this loan, not herein explicitly provided for, shall be left to the arrangement of the corporation, who are hereby authorized to issue a prospectus of the loan as soon as possible after the signing of this agreement.

The Tsung Li Yamen will instruct the Chinese Minister in London to cooperate with the corporation in any matters requiring conjoint action.

16. The loan shall be issued to the public as soon as possible after the signing of this agreement, and shall date from the first of the month of its issue. Payment of the entire proceeds will be made in London to the order of the administrator general not later than March 31, 1899; of the above proceeds the corporation will advance to the order of the administrator general in London, on or before October 31 next, the sum of £250,000; this advance will bear interest at the rate of 5 $\frac{1}{2}$ per cent per annum until such time as the first installment of the loan proceeds shall be available, when it shall be deducted from those proceeds by the corporation.

17. In the event of an unfavorable state of the market rendering the issue of this loan, and the payment of its proceeds to the Railway Administration, impossible on the terms named without loss to the corporation, the corporation shall be granted

such extension of time for the performance of its contract with the administrator general as the circumstances demand, any advances or installments of proceeds already made to the Railway Administration being in that case treated as regards payment of interest, repayment of principal, security, and Imperial Chinese Government guaranty in terms of this present agreement and as forming part of the principal amount of this loan. Similar extension of time for the issue of this loan and payment of its proceeds shall also be granted in the event of the Deutsch-Asiatische Bank, Berlin, objecting to its issue before the month of April next, in accordance with the terms of clause 9, of the agreement for the Chinese Imperial Government $4\frac{1}{2}$ per cent sterling loan of 1898.

18. Immediately after the signature of this agreement, and before the issue of the prospectus of the loan to the public, the administrator general will memorialize the Throne and obtain an imperial edict confirming and sanctioning the provisions of this agreement, the imperial edict so received being then communicated officially and without delay by the Tsung Li Yamen to the British Minister in Peking.

19. The corporation may, subject to all its obligations, transfer or delegate all or any of its rights and discretions to any British company, directors, or agents, in consultation with the administrator general, with or without power of further transfer and subdelegation.

20. This agreement is executed in quadruplicate in English and Chinese, one copy to be retained by the administrator general, one by the Tsung Li Yamen, one by the British Minister in Peking, and one by the corporation. Should any doubt arise as to the interpretation of the contract, the English text shall be accepted as standard.

Signed at Peking by the contracting parties this 25th day of the eighth month of the twenty-fourth year of the Emperor Kuang Hsu, being the 10th day of October, 1898, Western Calendar.

Appendix 5.—CANTON-KOWLOON RAILWAY.

AGREEMENT BETWEEN THE WAIWUPU (BOARD OF FOREIGN AFFAIRS OF THE CHINESE GOVERNMENT) AND THE BRITISH & CHINESE CORPORATION (LTD.) FOR THE ISSUE AND REGULATION OF A LOAN FOR THE CONSTRUCTION OF A RAILWAY FROM THE CITY OF CANTON TO THE BOUNDARY OF THE KOWLOON LEASED TERRITORY UNDER BRITISH CONTROL (HEREINAFTER CALLED THE RAILWAY).

This agreement is made at Peking on the twenty-third day of the first month of the thirty-third year of Kuang Hsu, corresponding to the seventh day of March, 1907, and the contracting parties are:

The Waiwupu, acting under the authority of an imperial decree, of the one part, and the British & Chinese Corporation (Ltd.) (hereinafter called the corporation) of the other part.

Whereas, a preliminary agreement was made on March 28, 1899, between His Excellency Sheng, Director General of the Imperial Chinese Railway Administration acting under the authority of the Tsung Li Yamen, of the one part, and the British firm of Jardine, Matheson & Co., for themselves and on behalf of the Hongkong & Shanghai Banking Corporation, representing as joint agents the corporation, of the other part, and it was part of the objects thereof that the terms of another preliminary agreement signed by the same contracting parties on May 13, 1898, should be thereby adopted as a preliminary agreement for the construction and working of a railway from the city of Canton to the boundary of the Kowloon leased territory under British control, subject, however, as far as might be practicable, to the terms and conditions thereafter agreed to in the final contract for the Shanghai-Nanking Railway when signed and ratified.

Now it is hereby agreed by and between the parties hereto as follows:

ARTICLE 1. The corporation agrees to issue, on behalf of the Imperial Chinese Government, a sterling loan (hereinafter referred to as "the loan") for the amount of £1,500,000 on the terms and conditions hereinafter contained. Imperial Chinese Government bonds are to be issued for the entire amount, similar to the bonds of the Shanghai-Nanking Railway, with the railway as first mortgage security therefor. The loan shall be in one issue, and the price agreed upon is 94 per cent of the nominal value, subject to the other provisions of this article as hereinafter stated. The interest on the bonds shall be at the rate of 5 per cent per annum on their nominal value, payable half-yearly, on the first day of June and the first day of December, and shall be calculated from the date of their sale to the public.

The loan shall be issued to the public as soon as possible after signing this agreement but if at the date of signature thereof, owing to an unfavourable state of the market rendering the issue of the loan and the payment of its proceeds to the Viceroy of Canton impossible on the terms above named, then in such case the corporation shall thereafter, at such time as the Chinese Government may decide within a period not exceeding eight months, issue the loan and pay the proceeds thereof to the Viceroy, deducting and retaining six points from the rate at which the loan is actually issued to the public, whatever that rate may be (that is, if the issue price be 101 the Viceroy will receive 95, and so on).

Subject to the provisions of article 16, the duration of the loan is fixed at 30 years commencing from the date of the signature of this agreement, but no interest shall be paid on any bonds which may be redeemed or cancelled under the terms hereinafter mentioned after the redemption or cancellation thereof.

On the face of each of these bonds shall be expressed the value thereof in the sum of £100, or in such different amounts as the Chinese Minister in London in consultation with the corporation may sanction.

It is understood that the Chinese Government may hereafter, in its discretion, appoint a director general of the railway upon whom, in such case, will devolve all the powers, functions, and responsibility herein attributed to the Viceroy of Canton (hereinafter called the Viceroy).

ART. 2. The proceeds of the loan are to be used in the construction and equipment of the railway, and in paying interest on the loan during the course of construction.

The railway, being the first mortgage security for the loan, shall be built and equipped under the direction of the Viceroy, in accordance with the provisions of article 6 hereinafter, and shall be built as economically as possible in accordance with the best modern system.

It is understood that the Viceroy will secure all the necessary land for the railway, and will give the necessary instructions to expedite and facilitate the work of construction. The railway will be built in the first instance as a single line, but provision will be made, with the approval of the Viceroy, and wherever necessary to meet traffic requirements, for the eventual construction of a double line.

If, during the time of construction, the proceeds of the loan, together with the accrued interest thereon, payable by the corporation, should, after the deduction of the sums necessary for the payments of interest on the loan, be insufficient to complete the construction of the railway, the amount of the deficiency shall either be provided from the Chinese Government's own resources or by a supplementary loan to be hereafter issued by the corporation, the interest and other conditions of which supplementary loan shall be arranged when the time arrives, having due regard to the conditions of the money market.

When the railway is complete, if there is a surplus from the sale of bonds, the said surplus shall be at the disposal of the Chinese Government, either to redeem the bonds in accordance with the terms of this agreement as hereinafter stated, or to be placed on deposit with the Hongkong & Shanghai Banking Corporation for the purpose of paying interest on the loan, or for other purposes beneficial to the railway, in regard to which the Viceroy will communicate in due course with the corporation.

In all matters relating to the construction of the railway it is expressly agreed that particular heed shall be paid to the opinions and habits of the Chinese people, and that, when practicable, Chinese shall be employed in positions of trust and responsibility in connection with the railway.

In regard to earthwork, or such other work as Chinese are competent to perform, contracts shall be entered into for such work with Chinese, under the sanction of the head office, and the work itself shall be carried out in accordance with plans and specifications of the engineer in chief and under his supervision.

Detailed plans and estimates of cost, whether of the respective sections of the railway, or of any alterations of the same, are to be submitted for the approval of the Viceroy, by the engineer in chief through the managing director.

ART. 3. The loan shall be secured by mortgage declared to be now entered into in equity by virtue of this agreement, and shall, as soon as possible hereafter, be secured by a specific and legal first mortgage in favour of the corporation upon all lands, materials, rolling stock, buildings, property, and premises of every description purchased or to be purchased for the railway, and on the railway itself, as and when constructed, and on the revenue of all descriptions derivable therefrom.

The provisions of this article in respect of the mortgage are to be construed and treated as equivalent in purport and effect to a mortgage customarily executed and delivered in England to a trustee for the purpose of securing loans and bond issues upon railway properties in foreign countries.

ART. 4. It is hereby agreed that in six months after this agreement is signed, the corporation shall provide the amount necessary to proceed with the detailed survey of the railway, and for preliminary construction work if necessary, whether this amount comes from the sale or hypothecation of the bonds, or from advances made, provided that bonds for the required amount shall have been executed and delivered to the corporation. If, after expiration of eight months from the date of the ratification hereof, the work of construction shall not have been begun on the railway, this agreement is to become null and void, but if failure to commence construction be due to any cause of force majeure, a reasonable extension of this time limit shall be arranged between the Viceroy and the corporation.

Of the proceeds realized from the sale of the bonds, after deducting so much of them as may be required to be kept in England for the purchase of materials and the payments of contracts there, or for repayment of advance, such amounts as may be estimated and certified to by the engineer in chief to the Viceroy through the managing director, as being actually required for the construction of any particular section of the railway, may be ordered by the Viceroy, after consideration, to be transferred to Hongkong to be kept in the Hongkong & Shanghai Bank, and placed to the credit of the construction account of the railway for the exclusive purpose of constructing the railway in the manner herein provided for under the supervision of the head office and the Viceroy.

On each occasion of a remittance being made to China, the amount realized in specie will be reported to the Viceroy, and any portion which may not be required shall be placed at interest. Similarly, the balance in England shall be placed at interest, to be allowed at the usual rate.

The accounts of the money spent from time to time in England, and of the money transferred to the credit of the construction and other accounts for use in China, are to be submitted quarterly to the head office for report to the Viceroy for the information of the Waiwupu, and for his further report to the Board of Revenue, and the Board of Communications, for record therein, after such accounts have been approved and signed by him.

ART. 5. As to the form of the bond, it is to be agreed upon by the Viceroy or by the Chinese Minister in London and the corporation, as soon as possible after the signature of this agreement, but if, hereafter, the money markets in London or other countries require any modification of the form of the bond, except in anything that affects the amount of the loan and the liability of the Chinese Government, which are not to be touched at all, such slight modifications may be made to meet the views of the money markets by the corporation in consultation with the Chinese Minister in London.

Any modifications are to be reported at once by the corporation to the Viceroy for the approval of the Waiwupu.

The bonds are to be engraved entirely in the English language, and shall bear the facsimile of the signature of the Viceroy and of his seal of office, in order to dispense with the necessity of signing them all in person, but the Chinese Minister in London shall, previous to the issue of any bonds, put his seal upon each bond with a facsimile of his signature, as a proof that the issue and sale of the bonds are duly authorized and binding upon the Chinese Government.

Such bonds are to be numbered consecutively, and as many bonds as may be needed are to be properly engraved under the supervision of the corporation, and after they are sealed by the Chinese Minister in London, as heretofore provided, are to be countersigned by the corporation.

All expenses for the engraving, safe deposit, and sale of the bonds are to be borne by the corporation.

ART. 6. When the work of construction is ready to begin, the Viceroy will establish a head office at Canton for the construction and management of the railway. This office will be under the direction of a Chinese managing director (appointed by the Viceroy) with whom will be associated a British engineer in chief, and a British chief accountant. These British employees shall be proposed and certified as competent for their posts, by the corporation, and shall be approved by the Viceroy; if their services should prove unsatisfactory to the Viceroy, he shall request the corporation to dispense with their services and to nominate their successors, and, in the event of the corporation desiring to remove them for good cause, it shall do so in consultation with the Viceroy. It is understood that the duties performed by these employees are intended to promote the mutual interests of the Chinese Government and the bondholders, respectively, and it is therefore agreed that all cases of difference arising therefrom shall be referred for amicable adjustment between the Viceroy and the representative of the corporation. The salaries and other terms of agreement of the engineer in chief and the chief accountant shall be proposed by the corporation, for approval by the Viceroy; and the amount of their salaries, etc., shall be paid out of the general accounts of the railway.

For all important technical appointments on the railway staff, Europeans of experience and ability shall be engaged, and wherever competent Chinese are available, they shall also be employed. All such appointments shall be made, and their functions defined, by the managing director and the engineer in chief in consultation, and shall be submitted for the Viceroy's approval; similar procedure shall be followed in the case of Europeans employed in the chief accountant's department. In the event of the misconduct or the incompetency of European employees, their services may be dispensed with by the managing director, after consultation with the engineer in chief, and subject to the sanction of the Viceroy. The form of agreements made with European employees shall conform to the usual practice.

The accounts of the receipts and the disbursements of the railway's construction and operation, shall be kept in Chinese and English in the Department of the chief accountant, whose duty it shall be to organize and supervise the same, and to report thereon for the information of the Viceroy through the managing director, and of the corporation. All receipts, and payments, shall be certified by the chief accountant and authorized by the managing director.

For the general technical staff of the railway the necessary arrangements shall be made by the managing director in consultation with the engineer in chief, and reported to the Viceroy in due course.

The duties of the engineer in chief shall consist in the efficient and economical construction and maintenance of the railway, and the general supervision thereof in consultation with the managing director. He shall always give courteous consideration to the wishes and instructions of the Viceroy, whether conveyed directly

or through the managing director, and shall always comply therewith, having at the same time due regard to the efficient construction and maintenance of the railway.

A school for the education of Chinese in railway matters shall be established by the managing director, subject to the approval of the Viceroy.

ART. 7. Under the provisions of article 3 of this agreement the properties covered by the first mortgage security hereby created include the railway, its property and equipment, and the mortgage is to be executed by a deed in the form contemplated by the said article. But subject to the guaranty and mortgage thus given by the Chinese Government, it is hereby declared that this railway is in fact a Chinese property.

All land that may be required along the whole course of the railway within survey limits, and for the necessary sidings, stations, repairing shops and car sheds, to be provided for in accordance with the detailed plans now made, or hereafter to be made by the engineer in chief, and approved by the Viceroy, shall be acquired by the Viceroy at the actual cost of the land, and shall be paid for out of the proceeds of the loan.

The title deeds of the land for the railway and all other lands shall be free from all encumbrances and entanglements and shall, from time to time, as soon as secured, be registered in the name of the railway.

Notices of all purchases of lands for the railway within the survey limit (together with corresponding title deeds) are to be transmitted by the railway head office under the direction of the Viceroy to the local agent of the corporation for record and preservation in its office in Hongkong, and for the purpose of establishing the first mortgage security until the time when the same are to be returned to the Viceroy, as herein-after in this article provided.

All lands, the title deeds of which are lodged with the corporation as part of the first mortgage security of the loan, shall not be disposed of in any way by hire, lease, or sale, to any party, for any purpose whatsoever, without the written consent of the Viceroy, except only in the event of the Imperial Chinese Government failing to pay the interest or principal of the bonds, and then in accordance with the powers in the deed of mortgage.

The lands thus bought shall be free from all encumbrances, liabilities, and entanglements, and shall be conveyed by full and sufficient deeds of assignment according to Chinese law, all of which are to be kept and recorded in the Hongkong office of the corporation, and are to be held by it as a first mortgage security for the bonds under the provisions of this agreement, until such time as principal and interest of the bonds, together with all indebtedness, shall have been paid off, when the same shall then be returned to the Viceroy, except only in the case of the Imperial Chinese Government's failure to pay the interest or principal of the bonds and consequent realization under the powers of the mortgage security.

For the proper protection of the first mortgage security the Chinese Government undertakes that until the bonds shall have been redeemed, no part of the lands comprised in the mortgage security or the railway with its appurtenances shall be transferred or given to another party, or shall be injured, and that the rights of the first mortgage shall not be in any way impaired, unless with the consent in writing of the corporation, which shall only be given if in the opinion of the corporation the interests of the bondholders will not be affected.

And further, that until the interest and principal of the loan and all the indebtedness shall have been paid off, or unless with the express consent in writing of the corporation, the Chinese Government or the Viceroy shall not again mortgage the above properties to another party whether Chinese or foreign.

During the period of this agreement no special taxes shall be levied by the Chinese Government on the railway, its appurtenances, or earnings; but all taxes at present payable, such as land tax, as well as any taxes which the Chinese Government may hereafter institute, such as stamp duty, etc., and which may be applicable generally to all commercial transactions in China, shall also apply in the case of the railway and its operations.

ART. 8. It is agreed that if the half-yearly interest on the bonds is not paid on any due date thereof, or if the principal of the loan be not paid in accordance with the amortization schedule hereto attached, the whole railway with all its appurtenances herein mortgaged to the corporation for the bondholders, shall be handed over to the corporation to be dealt with by it according to law in such manner as will insure the proper protection of the interests of the bondholders, provided, however, that if the failure to make payment at any one date be due to causes beyond the control of the Chinese Government, and if the Viceroy request the corporation to postpone the taking over of the railway for a reasonable period of grace, the question shall be amicably discussed and decided between the Viceroy and the representative of the corporation. When the whole loan and the interest due thereon and all

the indebtedness shall have been paid off, the railway with all its appurtenances in good working condition shall revert to the possession and management of the Chinese Government according to the provisions of this agreement.

ART. 9. As remuneration for all services rendered by the corporation during construction of the railway, the corporation shall receive the sum of £35,000, half of which shall be paid when the construction work is half completed, but not later than 18 months after commencement of construction, and the other half upon completion of the line. This amount shall be regarded as a commutation of all commissions to which the corporation and its agents would properly be entitled, and of payments of all services rendered in the construction equipment of the railway, in respect of the present loan; but in the event of any branch lines being decided upon by the Chinese Government for construction in connection with this railway, and if the Chinese Government decide to build the same by issue of a foreign loan and not from its own resources, then the corporation shall have the first option of tendering for such loan, and a further payment, proportionate to the amount of such supplementary loan, and calculated at the same rate as the commutation hereinabove mentioned, shall be made to the corporation as commutation of its commission for all services in respect of construction.

In return for this commuted commission, the Viceroy is entitled to require the corporation to superintend the purchase of all materials required for the construction and equipment of the railway, which shall be purchased in the open market at the lowest rate obtainable, it being understood that all such materials shall be of good and satisfactory quality. At equal rates and qualities, goods of British manufacture shall be given preference over other goods of foreign origin. Invoices and inspector's certificates are to be submitted to the Viceroy.

With a view to encouraging Chinese industries, Chinese Government and other materials are to be preferred, provided price and quality are suitable.

No commission shall be allowed to the corporation on the purchase of materials except as above provided. All trade discounts or rebates, if any, are, during construction, to go to the construction account, and after completion, to the credit of the railway.

ART. 10. In the construction of the line, in the working of the railway, and in the performance of the different kinds of business connected with the railway, no interference or obstruction by Chinese or foreigners will be permitted. The Chinese Government will provide protection for the railway while under construction or when in operation, and all the properties of the railway, as well as Chinese and foreigners employed thereon, are to enjoy the utmost protection from the local officials.

The railway may maintain a force of Chinese police with Chinese officers, their wages and maintenance to be wholly defrayed as part of the cost of the construction and maintenance of the railway. In the event of the railway requiring further protection by the military forces of the Imperial or provincial Governments, the same will be duly applied for by the head office and promptly afforded, it being understood that such military forces shall be maintained at the expense of the Government or the province.

ART. 11. All receipts and earnings of the railway shall be regularly paid into the railway's account with the Hongkong & Shanghai Banking Corporation, and on such funds, whether on daily balance or on fixed deposit, the bank's usual rate of interest shall be allowed.

All expenses of working and maintaining the line shall be paid from the receipts and earnings, and any remainder thereof shall be charged with the service of the loan. If, after payment of these expenses, and making due provision for payment of interest at 5 per cent per annum on the bonds, and for repayments of principal due in accordance with the amortization schedule hereto attached, there remain surplus funds unappropriated and properly available for other purposes, such funds shall be at the disposal of the Chinese Government to be used in such manner as the Viceroy may decide, provided always that after completion and opening of the line to traffic the amount sufficient for regular payments of interest and repayments of principal shall be deducted from such surplus funds, if any, and shall be deposited with the Hongkong & Shanghai Banking Corporation six months before the date at which such payments fall due.

In the event of there being no surplus funds available as aforesaid from the earnings of the railway, the amount required for payments of interest and repayments of principal shall be provided in accordance with the conditions of article 14 hereinafter.

ART. 12. The corporation are hereby appointed trustees for the bondholders, and in any future negotiations respecting these loans, or matters arising in connection

therewith, which may take place between the Viceroy and the corporation, the corporation shall be taken as representing the bondholders, and as such, empowered to act on their behalf. In view of the fact that the corporation's responsibility to the bondholders continues after construction, whereas, as stated in article 9, its commuted commission for services rendered is limited to the period of construction, and the corporation is not thereunder entitled to any further remuneration during the period of the loan, the corporation shall receive as remuneration for its services and responsibility in acting as trustees for the bondholders, the sum of £1,000 per annum, such remuneration to commence from the date of issue of this loan and to terminate upon its complete redemption.

ART. 13. All materials of any kind that are required for the construction and working of the railway, whether imported from abroad or from the provinces to the scene of the work, shall be exempted from likin so long as such exemption remains in force in respect of other Chinese railways. The bonds of this loan, together with their coupons and the income of the railway, shall be free from imposts of any kind by the Government of China.

ART. 14. It is agreed that during the time of the construction of the railway, the interest on the bonds and on any advances made by the corporation is to be paid from the proceeds of the loan. The accruing interest from any proceeds of the loan not used during the period of construction, and the earnings derived by the Chinese Government from the working of any sections of the railway as they are built, are to be used to make up the amount required for the payment of the said interest, and if any deficiency remains it is to be met from the proceeds of the loan.

When the construction of the railway is wholly completed, the interest on the bonds is to be paid, from the income or earnings of the railway received by the Chinese Government, every half year on the first day of June and the first day of December.

It is hereby agreed that the amount required for the payment of interest and the repayment of principal, together with a sum of one-quarter of 1 per cent on such amounts, to cover commission to the Hongkong & Shanghai Banking Corporation, who are hereby appointed agents for the entire service of repaying the loan, shall be paid to them 14 days before the due dates in Hongkong or in Canton (at the option of the Viceroy when settling exchange) in local currency sufficient to meet such payments in sterling in London, exchange for which shall be settled with the Hongkong & Shanghai Banking Corporation, the Viceroy having the option of settling exchange at any date or dates within six months previous to any due date for the repayment of interest and principal.

The Chinese Government unconditionally undertakes, and hereby promises, to pay the principal of the loan and the interest on the loan on the due dates fixed therefor. If, at any time, the earnings of the railway, together with funds available from the proceeds of the loan, are not sufficient to meet the interest on the bonds and the repayment of capital in accordance with the amortization schedule hereto attached, the Viceroy shall devise means for supplying the deficiency, and should his inability to do so appear probable, he shall memorialize the Government to take measures to make up the deficiency from other sources, and thus be ready to pay off the indebtedness, so that the required amount may be placed in each case at least 14 days previous to the due dates of such payments, in the hands of the Hongkong & Shanghai Banking Corporation.

ART. 15. The corporation may, subject to all its obligations, transfer or delegate all or any of its rights, powers, and discretions to its successors or assigns, but the corporation, which is a corporation formed under English law, shall not transfer its rights under this agreement to any other nation, or people of any other nationality, except British or Chinese. Similarly, the Chinese Government's rights and authority under this agreement shall not be transferred to persons of other nationality.

It is further understood that the Chinese Government will not build another line competing with this railway to its detriment.

ART. 16. The term of the loan, as stated in article 1, shall be 30 years. Repayment of principal shall commence after the expiry of 12½ years from the date of the loan and shall be completed in 17½ years by yearly payments to the Hongkong & Shanghai Banking Corporation as agents for the service of the loan, acting for the corporation under the terms of this agreement, in accordance with the amortization schedule hereto attached.^a

If, at any time after the expiry of 12½ years from the date of the loan, the Imperial Chinese Government should wish to redeem the outstanding amount of the loan, or any portion of it, not yet due under the provisions of the amortization schedule hereto attached, not less than six months' notice shall be given in writing by the Viceroy

^a Amortization schedule is omitted here.

to the representative of the corporation, declaring the number of additional bonds so required to be redeemed, whereupon the representative of the corporation shall immediately proceed to make such arrangements as may be necessary and usual for the redemption of the number of bonds specified, which, when duly redeemed after payment by the Imperial Chinese Government of the proper amount due thereon, shall be canceled and delivered to the Viceroy.

All bonds thus redeemed, in excess of the amount specified in the amortization schedule hereto attached, before the expiry of 25 years from the date of the loan, shall be paid for with a premium of 2½ per cent over their face value (that is, £102.10 will be required to pay for £100), but after 25 years bonds may be redeemed over and above the amounts specified in the schedule without premium upon notice being given in the manner above specified.

As soon as the loan has been completely redeemed, this agreement shall become null and void and the mortgage shall be canceled.

ART. 17. If, during construction, any proceeds of the sale of the bonds are lying unused and bearing interest on their deposit whilst the construction of the railway is going on, such interest is to be credited to the general account of the railway in order that the railway may enjoy the full advantage thereof.

It is also agreed that, if the corporation shall think it expedient before the sale of any of the bonds to advance any money for the work, such advances, together with the interest thereon not exceeding a charge of 6 per cent per annum, shall be deducted from the proceeds of the sale of the bonds.

ART. 18. The junction of the sections of the railway from Canton to the boundary of the Kowloon leased territory under British control, and from the said boundary to the port of Kowloon respectively, and the subsequent joint working of the two sections, shall be arranged by agreement between the Viceroy of Canton and the Governor of Hongkong.

ART. 19. This agreement is signed under the authority of an imperial edict dated the seventh day of February, 1907, which has been officially communicated to the British Minister in Peking by the Waiwupu.

ART. 20. This agreement is executed in quintuplicate in English and Chinese, one copy to be retained by the Viceroy, one by the Waiwupu, one by the Board of Communications, one by the British Minister, and one by the corporation, and should any doubt arise as to the interpretation of the agreement the English text shall be accepted as the standard.

Signed at Peking by the contracting parties this twenty-third day of the first month of the thirty-third year of the Emperor Kuang Hsu, being the seventh day of March, nineteen hundred and seven.

(Seal and signature of His Excellency Tang Shao-yi, representing the Waiwupu.)

Witnessed by—

For the British & Chinese Corporation (Ltd.):

J. O. P. BLAND.

Witnessed by—

JARDINE MATHESON & Co.

The Hongkong & Shanghai Banking Corporation:

H. GARDNER,
Acting Agent.

Joint Agents:

The BRITISH & CHINESE CORPORATION (LTD.).

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Appendix 6.—TIENTSIN-PUKOW RAILWAY.

RAILWAY AGREEMENT.

This agreement is made at Peking on the 10th day of the 12th Moon of the 33d year of Kuang Hsu, corresponding to the 13th day of January, 1908, and the contracting parties are:

His Excellency Liang Tun Yen, Acting Junior Vice President of the Waiwupu, duly authorized to act on behalf of the Imperial Government of China of the one part, and (a) the Deutsch-Asiatische Bank, Shanghai, (b) the Chinese Central Railway (Ltd.), London, hereinafter called The Syndicate, of the other part.

ARTICLE I. The Imperial Government of China authorizes the syndicate to issue a 5 per cent gold loan for an amount of £5,000,000. The loan shall be of the date on which the first series of bonds is issued to the public and shall be called the "Imperial Chinese Government Five Per Cent Tientsin-Pukow Railway Loan."

ART. II. The loan is designed to provide capital for the construction of a government railway line from a point connecting with the Imperial Railways of North China at or near Tientsin through Tehchow and Tsinanfu to Hsien near the southern frontier of Shantung, hereinafter known as the Northern Section of the Tientsin-Pukow Railway Line, and from Hsien to a point at or near Pukow (opposite Nanking on the Yangtze-kiang), hereinafter known as the Southern Section of the Tientsin-Pukow Railway Line. The total length of these two sections being about 1,085 kilometers, equal to about 2,170 Chinese li. The survey line shall be open to revision by the director general of the railway.

ART. III. The capital so provided shall be solely devoted to the construction of the railway line, including the purchase of land, rolling stock, and other equipment, and to the working of the line and to payment of interest on the loan during the period of construction, which is estimated at four years from the actual beginning of the works, the commencement of the works not to be delayed beyond six months after this agreement has been signed, within which period the syndicate shall notify the director general that the sum of £500,000 has been placed at his disposal, to be held in Europe or remitted to China as he may direct, as a first installment on account of the proceeds of the loan. This amount of £500,000, or whatever portion thereof is actually advanced, together with interest thereon not exceeding a charge of 6 per cent per annum, shall be deducted from the proceeds of the first sale of the bonds.

ART. IV. The rate of interest for the loan shall be 5 per cent per annum on the nominal principal and shall be paid to the bondholders half-yearly. The said interest shall be calculated from the date on which the loan is issued to the public and shall be paid by the Imperial Chinese Government during the time of construction either from the proceeds of the loan or from other sources, and afterwards, in the first place, out of the revenue of the railway, and then from such other revenues as the Chinese Government may think fit to use for the purpose in half-yearly installments according to the amounts specified in the schedule attached to this agreement, and 14 days before their due dates, Western Calendar, as calculated half-yearly from the date on which the loan is issued to the public.

ART. V. The term of the loan shall be 30 years. Repayment of principal shall commence after the expiry of 10 years from the date of the loan and except as provided in article VI hereinafter, shall be made by yearly amortization to the Deutsch-Asiatische Bank and the Hongkong & Shanghai Banking Corporation in half-yearly installments out of the revenues of the line or such other revenue as the Chinese Government may think fit to use for the purpose, according to the amount specified in the schedule attached to this agreement, but 14 days before their due date, Western Calendar, as calculated half-yearly, from the date on which the loan is issued to the public.

ART. VI. If at any time after the lapse of 10 years from the date of the loan the Imperial Chinese Government should desire to redeem the whole outstanding amount of the loan, or any part of it, not yet due for repayment in accordance with the schedule of repayments hereto attached, it may do so until the twentieth year, by payment of a premium of 2½ per cent on the face value of the bonds (that is to say, by payment

of £102 10s. for each £100 bond) and after the twentieth year without premium; but in each and every case of such extra redemption, the Imperial Chinese Government shall give six months' notice in writing to the syndicate and such redemption shall be effected by additional drawings of bonds, to take place on the date of an ordinary drawing, as provided for in the prospectus of the loan.

ART. VII. The Deutsch-Asiatische Bank and the Hongkong & Shanghai Banking Corporation having been appointed by the German and British parties of the syndicate, respectively, agents for the service of the loan, the half-yearly payments due for amortization and interest, referred to in articles IV and V, shall be made, in accordance with the amounts of the schedule attached to this agreement, and 14 days before their due dates as fixed by articles IV and V, to these banks by the director general of the railway, who shall hand to said banks in Shanghai or Tientsin 14 days before the said due dates in shares to be arranged by the banks, funds in Shanghai or Tientsin sycee sufficient to meet such payments in gold in Europe, exchange for which shall be settled with the said banks on the same day, the Railway Administration having, however, the option of settling exchange with the two banks at any date or dates within six months previous to any due date for the repayment of interest and principal. These payments may, however, be made in gold, if the Imperial Chinese Government should happen to have gold funds bona fide at their disposal in Europe not remitted from China for the purpose and desire so to use them.

In reimbursement of expenses connected with the payment of interest and the repayment of principal of the loan, the Hongkong & Shanghai Banking Corporation and the Deutsch-Asiatische Bank will receive a commission of one-quarter of 1 per cent on the annual loan service.

ART. VIII. The Imperial Government of China hereby engages that the interest and principal of this loan shall duly be paid in full, and should the revenue of the railway or the proceeds of the loan not be sufficient to provide for the due and full payment of interest and repayment of principal, the director general shall memorialize the Throne and the Imperial Government of China will thereupon make arrangements to ensure that the amount of the deficiency shall be met from other sources and handed over to the banks on the date upon which funds are required to complete full payment of interest and repayment of principal.

ART. IX. The loan is hereby secured:

1. By likin and internal revenues of the province of Chihli to the amount of 1,200,000 Haikwan taels a year.
2. By likin and internal revenues of the province of Shantung to the amount of 1,600,000 Haikwan taels a year, and
3. By revenue of the Nanking likin collectorate (to the amount of 900,000 Haikwan taels a year) and of the Huai-an native customs (to the amount of 100,000 Haikwan taels a year) in the Province Kiangsu.

The principal revenues as above stated are hereby declared to be free from all other loans, charges, or mortgages.

So long as principal and interest of the loan are regularly paid, there shall be no interference with these provincial revenues; but if the principal or interest of the loan be in default at due date, then, after a reasonable period of grace, likin and suitable internal revenues of the three Provinces sufficient to provide the amounts above stated shall forthwith be transferred to and administered by the Imperial Maritime Customs, in the interest of the bondholders. And so long as this loan or any part thereof shall remain unredeemed, it shall have priority as regards both principal and interest over all future loans, charges, and mortgages charged on the above-mentioned revenues of the three Provinces. No loan, charge, or mortgage shall be raised or created which shall take precedence of, or be on equality with this loan, or which shall in any manner lessen or impair its security over the revenues of the three Provinces as above stated; and any future loan, charge, or mortgage charged on the said revenues of the three Provinces shall be made subject to this loan, and it shall be so expressed in every agreement for every such future loan, charge, or mortgage.

It is understood and agreed that so long as this loan is unredeemed the railway shall under no circumstances be mortgaged nor its receipts given as security to any other party.

In the event of the Chinese Government, during the currency of this loan, entering upon definite arrangements for the revision of customs tariff accompanied by stipulations for decrease or abolition of likin, it is hereby agreed, on the one hand, that such revision shall not be barred by the fact that this loan is secured by likin and provincial revenues, and, on the other hand, that whatever likin is required to provide the security of this loan shall neither be decreased nor abolished except by previous arrangement with the syndicate, and then only in so far as an equivalent is substituted

for it in the shape of a first charge upon the increase of customs revenue consequent upon such revision.

ART. X. The syndicate is hereby authorized to issue to the subscribers to the loan, bonds for the total amount of the loan for such amounts as may appear advisable to the syndicate. The form of the bonds shall be settled by the syndicate in consultation with the director general or the Chinese Ministers in London and Berlin. The bonds shall be engraved in Chinese and English or Chinese and German as may be required; they shall bear the facsimile of the signature of the director general and of his seal of office, in order to dispense with the necessity of signing them all in person. But the Chinese Minister in London or Berlin, as the case may be, shall, previous to the issue of any bonds, put his seal upon each bond with a facsimile of his signature, as a proof that the issue and sale of the bonds are duly authorized by, and binding upon, the Imperial Chinese Government, and the representatives of the syndicate in London and/or Berlin shall countersign the bonds as agents for the issue of the loan.

In the event of bonds issued for this loan being lost, stolen, or destroyed, the syndicate shall immediately notify the director general and the Chinese Minister in London and/or Berlin, as the case requires, who shall authorize the syndicate to insert an advertisement in the public newspapers notifying that payment of same has been stopped and to take such other steps as may appear advisable or necessary according to the laws and customs of the country concerned, and should such bonds not be recovered after a lapse of time to be fixed by the syndicate, the director general or the Chinese Minister in London or Berlin, as the case may be, shall seal and execute duplicate bonds for a like amount and hand them to the syndicate, by whom all expenses in connection therewith shall be defrayed.

ART. XI. All bonds and coupons and payments made and received in connection with the service of this loan shall be exempt from all Chinese taxes and imposts during the currency of this loan.

ART. XII. All details necessary for the prospectus and connected with the payment of the interest and repayment of the principal of this loan, not herein explicitly provided for, shall be left to the arrangement of the syndicate in consultation with the Chinese Ministers in London and Berlin. The syndicate is hereby authorized to issue the prospectus of the loan as soon as possible after the signing of this agreement; and the Imperial Government will instruct the Chinese Ministers in London and Berlin to cooperate with the syndicate in any matters requiring conjoint action and to sign the prospectus of the loan.

ART. XIII. The loan shall be issued to the public in two or more series of bonds, the first issue to be made to the amount of £3,000,000 as soon as possible after the signature of this agreement and not later than 12 months from the date thereof. The price to the Imperial Chinese Government of the first series of bonds shall be 93 per cent of their nominal value. The second and any subsequent series shall be issued in time to permit of uninterrupted continuance of the work of construction, in amounts to be determined by the director general, and the price payable to the Chinese Government in respect of these series shall be the actual rate of their issue to the public, less flotation charges of 5½ points retainable by the syndicate (that is to say, a charge of £5 10s. 0d. for every £100 bond issued). Subscriptions will be invited by the syndicate in Europe and in China from both Chinese and Europeans on equal conditions, preference being given to the application of the Chinese Government, provided such application be made before the issue of the prospectus to the public.

ART. XIV. The proceeds of the loan shall be paid to the credit of the Tientsin-Pukow Government Railway account with the Hongkong & Shanghai Banking Corporation and the Deutsch-Asiatische Bank in China, London, or Berlin, as the case may be. Payments of loan proceeds into the credit of this account shall be made in instalments and on dates conforming to the conditions allowed to the subscribers to the loan. Interest at the rate of 4 per cent per annum shall be granted on the credit balance of the portion of this account kept in London and Berlin, and interest on the credit balance of the portion kept in China will be allowed at the banks' rates for current account or fixed deposits, as the case may be, to be hereafter arranged. After deduction of the funds required for the service of interest and for commission on this service during the time of construction, the banks will hold the net proceeds with accrued interest to the order of the director general, who, in ordering payment of any sums exceeding £20,000 shall give notice to the banks 10 days before the day on which they are required. Requisitions on the loan funds will be drawn in amounts to suit the progress of construction of the railway by orders on the Hongkong & Shanghai Banking Corporation and the Deutsch-Asiatische Bank, respectively, signed by the managing director of the railway, or, in his absence, by his duly authorized representative, and accompanied by his certificates stating the nature and cost of the work to be paid for.

Such amounts as may be required for expenditure in China may be transferred by the managing director, at his discretion, to Shanghai, the transfers being effected through the Hongkong & Shanghai Banking Corporation and the Deutsch-Asiatische Banks, respectively, and the transferred funds shall remain on deposit with those banks until required for railway purposes.

The accounts of the railway will be kept in Chinese and English in accordance with accepted modern methods, and will be supported by all necessary vouchers. During the period of construction the said accounts and vouchers will be open at any time to the inspection of an auditor, appointed and paid by the syndicate, whose duties will be confined to certifying to the syndicate to the due expenditure of the loan funds in accordance with the provisions of article 3 of this agreement, and to certifying to a monthly statement of the foreign materials purchased by the railway administration under the provisions of article 18 hereinafter. He will arrange with the Railway Administration that his inspections shall take place on such dates and at such intervals as will enable him to efficiently carry out his duties as herein provided. The railway administration will publish annually upon the close of its financial year, a report, in the Chinese and English languages, showing the working accounts and traffic receipts of the railway, which report shall be procurable by the public on application.

ART. XV. If during the time of construction the net proceeds of the present loan with accrued interest should, after deduction of the sums necessary for the service of interest on the loan, not be sufficient to complete the construction and equipment of the railway line, the amount of deficiency shall be provided, in the first place, from such Chinese funds as may be available so as to permit of the uninterrupted continuance of the work of construction, any balance then uncovered being supplemented by a further foreign loan for the amount required to be issued by the syndicate. The interest and other conditions of such supplementary loan will be the same as in the present agreement, and the price will be determined as in the case of the second and subsequent issues of the present loan. If after the completion of the line there should be a balance at credit of the railway account, such unused balance will be transferred to the credit of the interest reserve fund hereinafter mentioned in article 21 as a provision for payments for which the Imperial Chinese Government is responsible under this agreement.

ART. XVI. If, before the publication of the prospectus for the issue of the loan, any political or financial crisis should take place by which the market and the prices of existing Chinese Government stocks are so affected as to render, in the opinion of the syndicate, the successful issue of the loan impossible on the terms herein named, the syndicate shall be granted further extension of time, but not beyond 18 months from the date of this agreement, for the performance of their contract. If within this time limit the first series of the loan shall not have been issued, then this contract shall become null and void, and any advances made by the syndicate under the provision of article 3 shall be repaid by the Chinese Government with accrued interest, but without any other compensation or remuneration whatsoever.

ART. XVII. The construction and control of the railway will be entirely vested in the Imperial Chinese Government. For the work of construction of the Northern and Southern sections, respectively, the Imperial Chinese Government will select and appoint fully qualified German and British chief engineers acceptable to the syndicate. In the event of the syndicate objecting to any proposed appointment, the cause of such objection shall be definitely stated. These two chief engineers shall be under the orders of the managing director, or, in his absence, his duly authorized representative, and will carry out all the wishes of the railway administration with regard to the plan and construction of the line. In their general conduct they shall pay all due respect to the director general and the managing director. The terms of their respective agreements will be arranged by the director general on his sole authority.

Whenever appointments are to be made or functions are to be defined of the technical employees on the railway staff, as well as in the case of their dismissal, the managing director, or, in his absence, his duly appointed representative, will act in consultation with the chief engineer of the section concerned and, in the case of disagreement, the matter will be referred to the director general, whose decision shall be final.

After completion of construction the Imperial Chinese Government will administer both sections as one undivided Government Railway and will appoint an engineer in chief—who during the period of the loan shall be a European—without reference to the syndicate.

ART. XVIII. For the Northern and Southern sections of the railway, respectively, the Deutsch-Asiatische Bank and the Chinese Central Railways (Ltd.) will act as

agents of the railway administration during such construction for the purchase of all materials, plant, and goods required to be imported from abroad. For all important purchases of such material, tenders shall be called for by the managing director; and in the case of all tenders, indents, and orders for the importation of goods and materials from abroad, the said agents shall purchase the materials required on the terms most advantageous to the railway, and shall charge the original net cost of the same plus a commission of 5 per cent. It is understood that no orders for materials shall be executed or any expenditure incurred without due authorization by the managing director.

In return for payment of commission as above stated, the Deutsch-Asiatische Bank and the Chinese Central Railways (Ltd.) as agents within their respective sections, shall be prepared to superintend the purchase of all foreign materials required for the construction and equipment of the railway, which shall be purchased in the open market at the lowest rate obtainable, it being understood that all such materials shall be of good and satisfactory quality and that the railway administration shall have the right to reject on arrival in China materials which do not come up to specifications. At equal rates and qualities goods of German and British manufacture shall be given preference over other goods of foreign origin for the Northern and Southern sections, respectively. The railway administration reserves the right, while paying the above stipulated commission to the said agents in respect of all purchases of foreign materials, to avail itself of the services of other agents in China or abroad should it see fit to do so. Original invoices and inspector's certificates are to be submitted to the managing director; all return commissions and rebates of every description shall be credited to the railway; and all purchases made by the agents on behalf of the railway shall be supported by manufacturers' original invoices and inspectors' certificates.

No commission shall be paid to the agents except as above provided, but it is understood that the railway administration shall provide out of the railway funds for the remuneration of consulting engineers whenever their services are engaged.

With a view to the encouragement of Chinese industries, preference will be given, at equal prices and qualities, over British, German, or other foreign goods, to Chinese materials and goods manufactured in China. No commission will be paid on purchases of such materials and goods.

It is understood and agreed that after the construction of the line is completed, the Deutsch-Asiatische Bank and the Chinese Central Railways (Ltd.), within their respective sections, will be given the preference for such agency business during the currency of the loan for the supply of foreign materials as the railway administration may require, on terms to be hereafter mutually agreed upon.

ART. XIX. Branch lines in connection with the railway line mentioned in this agreement that may appear profitable or necessary later on shall be built by the Imperial Chinese Government with funds at their disposal from Chinese sources, and if foreign capital is required preference will be given to the syndicate.

ART. XX. By the preliminary agreement under imperial sanction a participation of 20 per cent of the net profits of the railway had been promised to the syndicate in remuneration for their general responsibility and services. In commutation of this participation in net profits the syndicate is granted the right to retain £200,000 out of the first issue of this loan, in installments and on dates based on, and in proportion to, the terms of the subscription to the loan as stated in the prospectus. No further payment in respect of commutation of profits will be allowed on any subsequent series of the loan, or on any supplementary loan.

ART. XXI. After payment of interest and repayment of principal of the loan for any current year, the railway administration will deposit with the Deutsch-Asiatische Bank and the Hongkong & Shanghai Banking Corporation in Shanghai or Tientsin any surplus of the net revenue of the railway line for that year up to the amount required to pay the following year's installments of interest on the loan, the rate of interest on the deposit being arranged with the banks from time to time with due regard to the conditions of the market.

ART. XXII. The Deutsch-Asiatische Bank and the Chinese Central Railways (Ltd.) may, subject to all their obligations under this agreement, transfer or delegate all or any of their rights, powers, and directions thereunder to any German or British company, directors, or agents with power of further transfer, and subdelegation, such transfer, subtransfer, delegation, or subdelegation to be subject to the approval of the director general.

ART. XXIII. This agreement is signed under authority of an imperial edict dated the 10th day of the 12th Moon of the 33rd year of Kuang Hsu, corresponding to the

13th day of January, 1908, Western Calendar, which has been officially communicated to the ministers of Great Britain and Germany in Peking by the Waiwupu.

ART. XXIV. Five sets of this agreement are executed in English and Chinese, three sets to be retained by the Imperial Chinese Government and two by the syndicate.

In the event of any doubt arising regarding the interpretation of the contract the English text shall rule.

Signed at Peking by the contracting parties the 10th day of the 12th Moon of the 33rd year of Kuang Hsu, corresponding to the 13th day of January, 1908, Western Calendar.

[Stamp of the official seal of the Waiwupu.]

[Deutsch-Asiatische Bank.]

[Chinese Central Railways (Ltd.)]

LIANG TUN YEN.

H. CORDES.

J. O. P. BLAND,
Representative.

Appendix 7.—PAULING & CO. LOAN.

AGREEMENT PROVIDING FOR THE FINANCING AND CONSTRUCTION OF A RAILWAY FROM A POINT ON THE YANGTZE RIVER OPPOSITE SHASI, VIA CHANGTEH, YUANCHOW, AND KWEIYANG, TO SHINGYI, IN THE PROVINCE OF KWEICHOW, WITH A BRANCH LINE CONNECTING CHANGTEH WITH CHANGSHA.

This agreement is made at Peking on the 25th day of the seventh month of the third year of the Republic of China, being the 25th day of July, 1914, and the contracting parties are the Chiao Tung Pu, duly authorized by the Government of the Republic of China (hereinafter sometimes referred to as "the Chinese Government" and sometimes as "the Government"), on the one part, and Messrs. Pauling & Co. (Ltd.), of 26 Victoria Street, London, S. W. (hereinafter termed the contractors), of the other part.

Now it is hereby agreed by and between the parties thereto as follows:

ARTICLE I. The contractors or their assigns agree to issue on behalf of the Government of the Republic of China a sterling loan bearing interest at the rate of 5 per cent per annum (hereinafter referred to as the loan) for the amount of £10,000,000 sterling.

The loan shall be of the date on which the first series of bonds are issued and shall be called "the Chinese Government Railways 5 per cent Gold Loan of 1914" [for the railways from a point on the Yangtze River opposite Shasi to Shingyi in the Province of Kweichow and a branch line from Changteh to Changsha].

In the event of the net proceeds of the loan being insufficient to defray the entire cost of the construction and equipment of the undermentioned railways (including interest on and commission for the service of the loan during construction as hereinafter provided) the total amount of the loan may be increased by a further amount not exceeding £2,000,000 sterling ranking pari passu with the present loan.

ART. II. The proceeds of the loan are designed for the construction and equipment of the railways from a point on the Yangtze opposite Shasi to Shingyi in the Province of Kweichow, together with a branch line from Changteh to Changsha (hereinafter called the railway), and for all necessary expenditure appertaining thereto and for the payments of the amounts agreed upon as compensation to the contractors for the cancellation of previous agreements as set forth in the supplementary agreement made this day between the Government and the contractors and as set forth in letters exchanged this day between the Government and the contractors.

ART. III. The payment of the interest and the redemption of the capital of the loan are guaranteed by the Government of the Republic of China and by a special lien upon the railway.

This special lien constitutes a first mortgage in favor of the contractors or their assigns acting on behalf of the bondholders (hereinafter called the trustees) upon the railway itself as and when constructed and on the revenue of all descriptions derivable therefrom and upon all materials, rolling stock, and buildings of every description purchased or to be purchased for the railway.

Should there be default in payments on the dates fixed of all or part of the half-yearly interest or amortization payments, the trustees shall have the right to exercise on behalf of the bondholders all the rights of action which may accrue to them from the special mortgage.

This special mortgage is to be executed by a deed in accordance with this article. But subject to the guaranty and mortgage thus given by the Chinese Government it is hereby declared that this railway is in fact a Chinese property. The title deeds of the land for the use of the railways shall be free from all encumbrances and entanglements and shall from time to time as soon as secured be registered in the name of the railway. Notices of all purchases of land for the railway within the survey limit, together with the corresponding title deeds, are to be transmitted by the railway head office to the representative of the trustees for record and for the purpose of establishing the first-mortgage security. Until the time when the same are to be returned to the Government as hereinafter in this article provided, all lands the title deeds of which are lodged with the trustees as part of the first-mortgage security for the loan

shall not be disposed of in any way by hire, lease, or sale to any party for any purpose whatsoever without the written consent of the Chinese Government, except only in the event of the Chinese Government failing to pay the interest or principal of the bonds and then in accordance with the powers in the deed of mortgage. The lands thus bought shall be free from all encumbrances, liabilities, and entanglements, and shall be conveyed by full and sufficient deeds of assignment according to Chinese law, all of which are to be kept and recorded by the representative of the trustees, and are to be held by them as a first-mortgage security for the bonds under the provisions of this agreement until such time as the principal and interest of the bonds, together with all indebtedness, shall have been paid off, when the same shall then be returned to the Chinese Government, except only in the case of the Chinese Government's failure to pay the interest or principal of the bonds and consequent action of the trustees under the powers of the mortgage security.

For the further protection of the first-mortgage security the Chinese Government undertakes that until the bonds shall have been redeemed no part of the lands comprised in the mortgage security or the railway with its appurtenances shall be transferred or given to another party or shall be injured, and that the rights of the first mortgage shall not be in any way impaired unless with the consent in writing of the trustees, which shall only be given if in the opinion of the trustees the interests of the bondholders will not be affected.

And further, that until the interest and principal of the loan and all the indebtedness shall have been paid off or unless with the express consent in writing of the trustees the Chinese Government shall not again mortgage the above properties to another party, whether Chinese or foreign.

ART. IV. It is agreed that if the half-yearly interest on the bonds is not paid on any due date thereof, or if the principal of the loan be not paid in accordance with the amortization schedule hereto attached, the whole railway, with all its appurtenances herein mortgaged to the trustees for the bondholders, shall be handed over to the trustees, to be dealt with by them according to law in such manner as will insure the proper protection of the interests of the bondholders, provided, however, that if the failure to make payment at any one date be due to causes beyond the control of the Chinese Government, and if the Chinese Government request the trustees to postpone the taking over of the railway for a reasonable period of grace, which shall not exceed six months, the question shall be amicably discussed and decided between the Chinese Government and the representative of the trustees. When the whole loan and the interest due thereon and all the indebtedness shall have been paid off, the railway, with all its appurtenances in good working condition, shall revert to the possession and management of the Chinese Government according to the provisions of this agreement.

ART. V. The interest on the bonds is to be paid every half year on the first day of June and the first day of December, and it is hereby agreed that the amount required for the payment of interest and the repayment of principal, together with the sum of a quarter of 1 per cent on such amounts to cover commission to the contractors or their assigns who are hereby appointed the agents for the entire service of paying the loan, shall be paid to the contractors or their assigns 14 days before the due dates. During the time of construction the amounts necessary for the payment of the interest on the loan, together with the commission of a quarter of 1 per cent above referred to, are to be paid over to the agents for the entire service of repaying the loan out of the proceeds of the loan on deposit with the issuing bank 14 days before the due dates and on the requisition of the contractors or their assigns. The accruing interest from any proceeds of the loan not used during the period of construction and the earnings derived by the Government from the working of any sections of the railway as they are built are to be used to make up the amount required for the payment of the said interest and if any deficiency remains it is to be met from the proceeds of the loan. When the construction of the railway is wholly completed the interest on the bonds, together with the commission for the service of the loan, is to be paid from the income or earnings of the railway received by the Government to the contractors or their assigns 14 days before the due dates in sterling in London.

The Chinese Government unconditionally undertakes and hereby promises to pay the principal of the loan and the interest on the loan on the due dates fixed therefor. If at any time the earnings of the railway, together with the funds available from the proceeds of the loan, are not sufficient to meet the interest on the bonds and the repayment of capital in accordance with the amortization schedule hereto attached, the Government shall take measures to make up the deficiency from other sources and then be ready to pay off the indebtedness so that the required amount may be placed in each case at least 14 days previous to the due dates of such payment in the hands of the contractors or their assigns.

ART. VI. The bonds shall be bonds of the Government of the Republic of China.

ART. VII. The duration of the loan is fixed at 40 years, commencing from the date of the issue of the loan, but no interest shall be paid on any bond which may be redeemed or canceled under the terms hereinafter mentioned after the redemption or cancellation thereof. On the face of each of these bonds shall be expressed the value thereof in the sum of £100 or any such different amounts as the Chinese Minister in London, in consultation with the contractors or their assigns, may sanction.

Repayment of principal shall commence after the expiry of 12½ years from the date of the loan and shall be completed in 27½ years by yearly payments to the contractors or their assigns as agents for the service of the loan under the terms of this agreement in accordance with the amortization schedule hereto attached. If at any time after the expiry of 12½ years from the date of the loan the Chinese Government should wish to redeem the outstanding amount of the loan or any portion of it not yet due under the provisions of the amortization schedule hereto attached, not less than six months' notice shall be given in writing by the Chinese Government to the representative of the contractors or their assigns declaring the number of additional bonds so required to be redeemed, whereupon the representative of the contractors or their assigns shall immediately proceed to make such arrangements as may be necessary and usual for the redemption of the number of bonds specified, which, when duly redeemed after payment by the Chinese Government of the proper amount due thereon, shall be canceled and delivered to the Chinese Government.

All bonds thus redeemed in excess of the amount specified in the amortization schedule hereto attached before the expiry of 25 years from the date of the loan shall be paid for with a premium of 2½ per cent over their face value (that is, £102 10s. would be required to be paid for £100), but after 25 years bonds may be redeemed over and above the amount specified in the schedule without premium upon notice being given in the manner above specified.

As soon as the loan has been completely redeemed this agreement shall become null and void and the mortgage shall be canceled.

ART. VIII. As to the form of the bonds, it is to be agreed upon by the Chinese Government or by the Chinese Minister in London and the contractors or their assigns as soon as possible after the signature of this agreement, but if hereafter the money markets in London or other countries require any modification of the form of the bonds except in anything that affects the amount of the loan and the liability of the Chinese Government (which are not to be touched at all) such slight modifications may be made to meet the views of the money markets by the contractors or their assigns in consultation with the Chinese Minister in London. Any modifications are to be reported at once by the contractors or their assigns to the Chinese Government.

The bonds are to be engraved entirely in the English language and shall bear a facsimile of the signature of the Minister of Communications and of his seal of office in order to dispense with the necessity of signing them all in person, but the Chinese Minister in London shall, previous to the issue of any bonds, put his seal upon each bond with a facsimile of his signature as a proof that the issue and sale of the bonds are duly authorized and binding upon the Chinese Government.

Such bonds are to be numbered consecutively, and as many bonds as may be needed are to be properly engraved under the supervision of the contractors or their assigns, and after they are sealed by the Chinese Minister in London as heretofore provided are to be countersigned by the contractors or their assigns.

If any of the bonds herein mentioned are lost or destroyed, a reissue of any thereof is to be made in the amounts respectively called for by such lost or destroyed bonds, but proper proof of the loss or destruction must be given in the usual form to the contractors or their assigns and the Chinese Minister in London for examination and record, and the requisite guaranty is to be obtained by the contractors or their assigns from the respective claimants concerned, who shall defray all expenses connected with such reissue of bonds lost or destroyed and who under the said guaranty shall undertake to indemnify the Chinese Government and/or the contractors or their assigns for any loss sustained by reason of the issue of bonds in the place of the bonds lost or destroyed.

ART. IX. All details necessary for the prospectus and connected with the payment of interest and repayment of the principal of this loan not herein explicitly provided for shall be left to the arrangement of the contractors or their assigns in consultation with the Chinese Minister of London. The contractors or their assigns are hereby authorized to issue the prospectus of the loan as soon as possible after the signing of this agreement, and the Chinese Government will instruct the Chinese Minister in London to cooperate with the contractors or their assigns in any matters requiring conjoint action and to sign the prospectus of the loan.

ART. X. The loan shall be issued to the public in two or more series of bonds, the first issue to be made to the amount of from £1,000,000 to £2,000,000 sterling as soon as possible after the signature of this agreement. The issue price of the bonds shall be fixed by the Government and the contractors or their assigns some time before the issue, taking the last price of similar bonds as a basis for fixing the market price. The prices payable to the Government shall be the actual rate of issue to the public less a sufficient amount to cover the cost of stamps on the bonds in the various countries of issue (provided always that at least 50 per cent of the bonds shall be issued in London) plus flotation charges of 4 per cent retainable by the contractors or their assigns (that is to say, a charge of £4 for every £100 bond issued).

After this agreement is signed and pending the issue of the loan, the contractors or their assigns shall deposit the sum of £50,000 with the issuing bank to the railway account, and this amount can be drawn on by the Government for survey and other necessary expenses authorized by the managing director against certificates signed by the chief accountant and engineer in chief and pending their appointment against certificates signed by the representatives of the contractors. This sum of £50,000 shall bear interest at the rate of 5 per cent per annum and shall be refunded out of the proceeds of the loan.

ART. XI. The net proceeds of the loan shall be deposited with the issuing bank to be nominated and guaranteed by the contractors to the credit of "A Shasi-Shingyi Changteh-Changsha Railway Account" and shall bear interest at the rate of one-half of 1 per cent below the official rates of the Bank of England.

When the work of construction is ready to begin, a sum equal to the estimated expenditure in China for six months shall be transferred to a bank in China to be nominated and guaranteed by the Government and there paid to the credit of "A Shasi-Shingyi Changteh-Changsha Railway Account" to be operated upon by the Government under certificate signed by the chief accountant and the engineer in chief. This amount of estimated expenditure for six months shall be maintained by subsequent monthly transfers so that, as far as possible, there shall always be six months' estimated expenditure in China deposited in a bank in China to be nominated and guaranteed by the Government. The rate of interest to be paid by such bank in China to be at the ruling rates of the day in China.

ART. XII. The contractors or their assigns (herein called the trustees) are hereby appointed trustees for the bondholders, and in any future negotiations respecting this loan or matters arising in connection therewith which may take place between the Chinese Government and the trustees, the trustees shall be taken as representing the bondholders and as such empowered to act on their behalf. In view of the fact that the trustees will continue to represent the bondholders after construction, they shall receive as remuneration for their services and duties in acting as trustees for the bondholders the sum of £1,000 per annum, such remuneration to commence from the date of issue of this loan and to terminate upon its complete redemption.

ART. XIII. When the railway is complete, if there is a surplus from the sale of bonds the said surplus shall be at the disposal of the Chinese Government either to redeem the bonds in accordance with the terms of this agreement as hereinafter stated or to be placed on deposit with a bank to be mutually agreed upon for the purpose of paying interest on the loan or for other purposes beneficial to the railway in regard to which the Chinese Government will communicate in due course with the trustees.

ART. XIV. All lands that may be required along the whole course of the railway within the survey limits and for the necessary sidings, stations, repairing shops, and car sheds to be provided for in accordance with the detailed plans shall be acquired by the Government at the actual cost of the land, together with the necessary expenses connected with its acquirement, and shall be paid for out of the proceeds of the loan.

ART. XV. Immediately after the signing of this agreement the Government will establish a head office at Changsha or some equally convenient place for the railway and will maintain the same until all bonds are paid off. This office will be under the direction of a Chinese managing director who shall, during the period of construction, be a Chinese engineer of standing to be appointed by the Government, with whom will be associated a chief accountant (hereinafter called the chief accountant), who shall be an Englishman and may be the representative of a British firm of public accountants of recognized standing, and after the completion of construction an engineer in chief (hereinafter called the engineer in chief after construction), who shall be an Englishman. These British employees and their successors in office shall be nominated by the Government and the trustees jointly and shall be appointed by the Government. The dismissal of these British employees and their successors in office shall take place only with the joint approval of the Government and the trustees, and any vacancies caused from time to time by the death, dismissal, resignation, or retirement of both or either of them or of their respective successors shall, while this article

remains in force, be filled up by the nomination and appointment, in manner aforesaid, of persons of British nationality and similarly qualified as aforesaid.

It is understood that the duties to be performed by these employees are intended to promote the mutual interests of both the Government and the bondholders, and it is therefore agreed that all cases of difference arising therefrom shall be referred for amicable adjustment between the Government and the representatives of the trustees. The salaries and other terms of agreement of the engineer in chief after construction and the chief accountant shall be arranged between the Government and the trustees and the amount of their salaries, etc., shall be paid out of the general accounts of the railway.

For all important technical appointments for the operation of the railway, Europeans of experience and ability shall be engaged, and wherever equally competent Chinese are available they shall be preferably employed. All such appointments shall be made and their functions defined by the managing director and the engineer in chief after construction in consultation and shall be submitted for the approval of the Government. Similar procedure shall be followed in the case of Europeans employed in the chief accountant's department. In the event of the misconduct or the incompetency of these European employees their services may be dispensed with by the managing director after consultation with the engineer in chief after construction and subject to the sanction of the Government. The form of agreement made with these European employees shall conform to the usual practice.

The accounts of the receipts and the disbursements of the railway's construction and operation shall be in Chinese and in English in the department of the chief accountant, whose duty it shall be to organize and supervise the same and to report thereon for the information of the Government through the managing director and of the trustees as representing the bondholders. All receipts and payments shall be certified by the chief accountant and authorized by the managing director.

The chief accountant shall so employ his Chinese staff that the principal members thereof shall have every opportunity of becoming thoroughly acquainted with the whole system and method of the accountant's department.

For the general technical staff of the railway after completion of construction the necessary arrangements shall be made by the managing director in consultation with the engineer in chief after construction and reported to the Government in due course.

The duties of the engineer in chief after construction shall consist in the efficient and economical maintenance of the railway and the general supervision thereof in consultation with the managing director.

The engineer in chief after construction shall always give courteous consideration to the wishes and instructions of the Government, whether conveyed directly or through the managing director, and shall always comply therewith, having at the same time due regard to the efficient maintenance of the railway.

During the period of construction a fixed yearly sum, which shall be paid out of the proceeds of the loan, and the amount of which shall be decided between the Minister of Communications and the contractors or their assigns, shall be placed at the disposal of the Board of the Ministry of Communications to be used for office expenses at the discretion of the Minister of Communications.

A school for the education of Chinese in railway matters shall be established by the managing director subject to the approval of the Government.

The provisions of this article shall take effect and remain in force not only during construction, in so far as they apply, but thereafter as long as any of the bonds are outstanding and unredeemed.

ART. XVI. Immediately after the signing of this agreement the Government shall appoint for the period of construction a British firm of consulting engineers (hereinafter called the consulting engineers) of recognized standing to be selected solely by the Government provided that the contractors shall have the right to object when such selection is, in the opinion of the contractors, detrimental to the construction or to the interests of the bondholders, and in that case the contractors shall put their reasons for objecting in writing so that the Government may reconsider the matter. The representative in China of the consulting engineers, who shall be an Englishman, shall be the engineer in chief during construction (hereinafter called engineer in chief during construction) and shall be associated with the managing director. The removal or dismissal of the consulting engineers and/or their successors in office shall only take place with the joint approval of the Government and the trustees, and fresh appointments of consulting engineers, who shall also be of British nationality and recognized standing, shall only be made in the manner aforesaid.

The engineer in chief during construction shall supervise the efficient construction of the railway by the contractors in the interests of the Government and the bondholders in accordance with the terms of this agreement.

It is understood that the duties to be performed by the consulting engineers and the engineer in chief during construction are intended to promote the mutual interests of the Government and the bondholders, respectively, and it is therefore agreed that all cases of difference arising therefrom shall be referred for amicable adjustment between the Government and the representative of the trustees. The salaries and other terms of agreement of the consulting engineers and the engineer in chief during construction shall be arranged between the Government and the trustees, and the amount of their salaries, etc., shall be paid out of the general accounts of the railway.

The consulting engineers and the engineer in chief during construction shall always give courteous consideration to the wishes and instructions of the Government, whether conveyed directly or through the managing director, from whom they shall receive technical instructions and shall always comply therewith, having at the same time due regard to the efficient construction and equipment of the railway so that it may form good security for the bondholders.

The plans and specifications and all type drawings of the railway are to be prepared by the consulting engineers subject to the supervision and approval of the managing director, having due regard to the future earning power of the capital to be expended in construction and equipment, to the local conditions and requirements, to economical construction, and to the probable amount of traffic of the railway—keeping in mind that an economically designed line of efficient construction, earning power, and equipment is required in the interests of the Government and so as to form good security for the bondholders.

A sufficient amount of rolling stock, including locomotives for the operation of the railway, shall be provided and the engineer in chief during construction, in consultation with the managing director, shall decide the specifications both as to quality and quantity of the same, having due regard to the probable amount and nature of the traffic of the railway.

ART. XVII. Should the Chinese Government adopt a unified system for railway operation and accounts, and a general standard for equipment, permanent-way material, and steel sections, the management of the railway shall comply with such system and standards, provided that the adoption of such system and/or standards does not conflict with the interests of the bondholders.

ART. XVIII. The contractors are hereby appointed the agents of the Government of the Republic of China for the construction and equipment of railway and works, and as such agents the contractors shall in a good and workmanlike manner and with good materials and to the reasonable satisfaction of the managing director and the engineer in chief during construction, construct and complete the railway and works according to the specifications and plans. The contractors shall locate the railway in accordance with the instructions of the Government conveyed through the managing director and to the satisfaction of the engineer in chief during construction.

The contractors are hereby appointed as agents for the Railway Administration during construction for the purchase of all material, plant, and goods required to be imported from abroad. For all important purchases of such materials tenders may be called for by the managing director, and the decision with regard to the acceptance or refusal of such tenders shall rest with the managing director subject to the approval of the engineer in chief during construction. In the case of all tenders, indents, and orders for the importation of goods and materials from abroad, the said agents shall purchase the materials required on the terms most advantageous to the railway and shall charge the original net cost of same together with the remuneration specified in Article XXI of this agreement. It is understood that no orders for materials shall be executed or any expenditure incurred without the approval of the managing director and the engineer in chief during construction.

The contractors shall arrange for inspection before shipment of all materials purchased abroad and shall charge the actual cost of such inspection.

The managing director and engineer in chief during construction shall arrange for the inspection of all important materials purchased in China, and no materials shall be accepted without their joint approval.

ART. XIX. The contractors shall appoint a competent and duly authorized agent, who shall be reasonably satisfactory to the Government, to reside on or near the works to represent them (the contractors) and have on their behalf charge of the railway and works during construction, and also as many competent and responsible engineers, inspectors, foremen, superintendents, subagents, overseers, and laborers as they may deem to be from time to time necessary. The contractors shall also provide all the necessary medicines and medical attendance for all persons employed on the railway and works.

The contractors undertake on their part that their foreign staff shall observe the usages of courtesy, together with due respect to the established institutions of the

country, the treaty regulations, and rules of the Republic of China recognized as applicable to foreign residents in China. Should any of the above foreign staff misbehave or not submit to restraint or show disrespect for the Chinese local authorities or illtreat the country people, they shall, on notice being brought to the contractors, be forthwith impartially dealt with according to the circumstances of the case.

Should any complaint be made at any time by the managing director against any of the staff of the contractors, Chinese or foreign, about his or their improper actions or bad character and manners, the matter shall be at once investigated so that justice may be equitably and impartially administered. Should the complaint or charge be proven the objectionable person or persons shall be removed on the spot.

Chinese technical assistants employed in the construction shall be given every facility by the contractors to acquire a knowledge of railway construction in all its departments, and the engineering staff shall be instructed to help them as far as possible by affording all information relating to the construction.

ART. XX. All the land required for the railway and for all the purposes of construction (including ballast and borrow pits), whether permanent or temporary, with all right-of-way facilities and access to the same, shall be placed at the service of the contractors in due and proper time, as far as possible, enabling all the works of construction to proceed without delay or hindrance, and when requisitioned by the contractors.

ART. XXI. The price to be paid by the Government to the contractors for the construction and equipment and maintenance during construction of the railway shall be an amount equal to the actual out-of-pocket cost thereof to the contractors together with a further sum equal to 5 per cent on the original net cost of all materials, plant, and goods required to be imported from abroad. The actual cost shall include all plant, tools, wages for superintendents, staff, management, and labor, and all expenses, if any, which may be actually incurred by the contractors, providing passages out and home for staff, skilled artisans, and other workmen specially sent from Europe or elsewhere, and any expense actually incurred by the staff for traveling specially and exclusively on the work of this contract, and the actual cost of all plant, materials, stores, and tools purchased, according to the cost price of same delivered at the works, and also all moneys paid for hire of plant and expenses actually incurred by the contractors in connection with any commissariat arrangements which may be made for the supply of food and other things for the convenience of the staff employed by the contractors on the works, including the medical staff, medicines, and the necessary equipment for same.

Provided, that no contract, subcontract, engagement of workmen, or other obligation of any kind by which such out-of-pocket expenses might be in any way affected shall be entered into or made by the contractors without the previous consent of the managing director and consulting engineers, and if any out-of-pocket expenses shall be incurred by the contractors under any contract, subcontract, arrangement, or obligation entered into or made without such previous consent of the managing director and the consulting engineers, such out-of-pocket expenses shall, if the managing director and the consulting engineers think fit, be wholly or to such extent as the managing director and consulting engineers think fit disallowed in the contractor's accounts, but this shall not apply to the staff employed by the contractors and the salaries paid to them, which shall be at the discretion of the contractors. Provided, that the salaries and allowances of the European engineers and European clerical staff other than the contractors' agent and the principal engineer under him shall be similar to such as are paid to Europeans in other works of the same nature in China.

The term "equipment" shall be held to include in its meaning all requirements necessary for the operation of the railway, and shall therefore include rolling stock and locomotives sufficient for operation. It is clearly understood that the term "equipment" does not include any purchase made for the railway after it has been completely constructed and equipped and handed over ready for operation. It is further clearly understood that the cost of land purchased for the railway and salaries of the managing director, chief accountants, consulting engineers, and the cost of their offices and staff shall not be included in the meaning of the term "construction and equipment."

ART. XXII. The Government shall at all times keep the contractors in funds to meet expenditure on this contract. For the purpose of ascertaining the amounts to be paid by the Government to the contractors from time to time the contractors shall, not less than seven days before the end of each month, furnish to the engineer in chief during construction an account showing the estimated amount to be expended on the works during the then ensuing month, and the Government shall on the first day of each month authorize payment to a bank to be nominated by the contractors to the credit of the contractors the amount of such estimate together with any balance then due to the contractors in respect of previous expenditure or, as the case may be, after deducting any balance then in the hands of the contractors and then not expended.

ART. XXIII. The contractors shall have the full and free use of all the railway and works under construction and the equipment as well as all the land, including borrow pits, quarries, ballast pits, brick field, etc., required for the purpose of the railway sidings, stations, buildings, workshops, water supplies, etc., during the period of construction and shall hand over the same on completion of the railway.

The managing director and engineer in chief during construction and their deputies shall at all times have access to the works for purposes of inspection, and they shall be afforded full information regarding the construction and works, and they shall also at all times have access and the right to make copies of the records, accounts, subcontracts, and vouchers kept in the various departments established by the contractors.

ART. XXIV. After the completion of the survey the Government may arrange with the contractors, if the Government so thinks fit, for the payment to the contractors of a bonus or bonuses conditional on the construction and equipment of any section or sections of the railway being completed within a fixed sum and time to be determined by the Government, but this arrangement shall not entail any obligation on the contractors to complete such section or sections within a fixed sum or time or any penalty on the contractors should they fail to complete such section or sections within a fixed sum or time.

ART. XXV. The Government shall prevent any interference with or hindrance or molestation to the contractors and shall take such precautions as may be necessary for the safety of the contractors' men and property.

ART. XXVI. The property of the contractors' staff and all matters and persons in connection with the works shall be protected by the Government, which shall see that the place is at peace without any organized hindrance. In case of any difficulty as to labor affecting the works, the Government shall use its best endeavor, in cooperation with the contractors, in equitably adjusting the same and shall do all in its power to assist the contractors in getting labor when required.

ART. XXVII. The managing director, the engineer in chief during construction, and the contractors' agent shall, from time to time, meet and confer upon any necessary matter in connection with the execution of the work and, acting harmoniously together in the interest of their respective principals, shall determine a mode of operation and line of action to their mutual satisfaction, but in case of and as often as any difference or dispute concerning or relating to the railway or the equipment or to anything appertaining to the carrying out of the construction (except where otherwise provided for herein) shall arise the subject of such difference or dispute shall be at once referred to the Government by the complaining party and the Government shall promptly and equitably adjudicate upon the same. But should either party feel aggrieved or be not satisfied by the adjudication, then the matter in question shall be at once referred to two independent arbitrators appointed by the parties, who shall act in accordance with the arbitration laws in force in England and who shall investigate and decide the matter or matters equitably. Should they fail to arrive at a unanimous decision they shall then refer the matter or matters in question at once to the decision of an umpire to be chosen and appointed by the above-mentioned arbitrators, whose decision shall be final and binding upon both parties hereto.

ART. XXVIII. The contractors shall make available the temporary track while under construction for public traffic as far as possible consistent with the requirements of construction, and traffic carried over the same shall be in accordance with a schedule of rates and terms to be settled by the managing director. After all expenses whatsoever which the chief accountant may allocate in connection with this traffic have been paid out of the receipts therefor the contractors shall receive one-third of the remainder.

ART. XXIX. The contractors shall hand over to the Government each section of the railway when it is, in the opinion of the managing director and engineer in chief during construction, completed for operation subject to the provisions of this agreement appertaining thereto. On completion of the survey the sections shall be defined.

ART. XXX. The railway may maintain a force of Chinese police and Chinese officers under the orders of the managing director, their wages and maintenance to be wholly defrayed as part of the cost of the construction and maintenance of the railway. In the event of the railway requiring further protection by the military forces of the Government, the same shall be duly applied for by the head office and promptly afforded, it being understood that such military forces shall be maintained at the expense of the Government.

ART. XXXI. All materials of any kind that are required for the construction and working of the railway, whether imported from abroad or from the Province to the scene of work, shall be exempt from likin or other duties so long as such exemption remains in force in respect of other Chinese present and future railways. The bonds of the loan, together with their coupons and the income of the railway, shall be free from imposts of any kind by the Government of the Republic of China.

ART. XXXII. With a view to encouraging Chinese industries, rails manufactured at the Hanyang Steel & Iron Works, native cement, and other goods manufactured and produced in China are to have a preference at equal price and quality. At equal rates and qualities, goods of British manufacture shall be given preference over other goods of foreign origin.

ART. XXXIII. The contractors may, with the approval of the Government and subject to all their obligations, transfer or delegate all or any of their rights, powers, and discretions to their successors or assigns, provided they are of British nationality.

ART. XXXIV. On the signing of this agreement the Government of the Republic of China shall officially notify the British Minister at Peking of the fact.

ART. XXXV. This agreement is executed in quadruplicate in English and Chinese, two copies to be retained by the Government, one to be forwarded to the British Minister at Peking, and one to be retained by the contractors. Should any doubt arise as to the interpretation of the agreement, the English text shall be accepted as the standard.

Signed at Peking by the contracting parties on this 25th day of the seventh month of the third year of the Republic of China, being the 25th day of July, nineteen hundred and fourteen.

SUPPLEMENTARY AGREEMENT PROVIDING FOR CANCELLATION.

Supplementary agreement providing for the cancellation of an agreement made on the 18th day of December, 1913, between the Chiao Tung Pu, duly authorized by the Government of the Republic of China, on the one part, and Messrs. Pauling & Co. (Ltd.), of 26 Victoria Street, London, S. W., of the other part, and for due compensation therefor to Messrs. Pauling & Co. (Ltd.).

This agreement is made at Peking on the 25th day of the seventh month of the third year of the Republic of China, being the 25th day of July, 1914, and the contracting parties are the Chiao Tung Pu, duly authorized by the Government of the Republic of China (hereinafter referred to as the Government), of the one part, and Messrs. Pauling & Co. (Ltd.), of 26 Victoria Street, London, S. W. (hereinafter termed the contractors), of the other part.

Whereas an agreement was made on the 18th December, 1913, between the Government and the contractors (hereinafter termed the preliminary agreement) for the financing and construction of a railway from a point on the Yangtze River opposite Shasi via Changteh, Yuanchow, and Kweiyang to Shingyi in the Province of Kweichow, with a branch line connecting Changteh with Changsha (hereinafter called the railway).

And whereas an agreement has been entered into this day between the Government and the contractors (hereinafter termed the detailed agreement) providing for the financing and construction of the railway.

Now it is hereby agreed by and between the parties thereto as follows:

ART. I. The preliminary agreement is hereby cancelled, and the contractors shall receive as compensation for the cancellation thereof a sum (hereinafter termed the compensation) equal to 7 per cent on the actual cost of the construction and equipment and maintenance during construction of the railway less the 5 per cent commission on materials purchased abroad provided for in article XXI of the detailed agreement. Such actual cost shall include all plant, tools, wages for superintendence, staff, management, and labor and all expenses, if any, which may be actually incurred by the contractors providing passages out and home for staff skilled artisans and other workmen specially sent from Europe or elsewhere and any expenses actually incurred by the staff for traveling specially and exclusively on the work arranged for in the detailed agreement and the actual cost of all plant, materials, stores, and tools purchased, according to the cost price of the same delivered at the works, and also all moneys paid for hire of plant and expenses actually incurred by the contractors in connection with any commissariat arrangements which may be made for the supply of food and other things for the convenience of the staff employed by the contractors on the works, including the medical staff, medicines, and the necessary equipment for same.

The term "equipment" shall be held to include in its meaning all requirements necessary for the operation of the railway and shall therefore include rolling stock

and locomotives sufficient for operation. It is clearly understood that the term "equipment" does not include any purchases made for railway after it has been completely constructed and equipped and handed over ready for operation. It is further clearly understood that the cost of land purchased for the railway, the salaries of the director general, chief accountants, and consulting engineers, and the cost of their offices and staff shall not be included in the meaning of the term "construction and equipment."

ART. II. Five-sevenths of the compensation of the 7 per cent provided for and defined in Article I of this agreement shall be paid to the contractors by the Government immediately on the presentation of each certificate of expenditure signed by the managing director, the engineer in chief during construction, and the chief accountant, and the balance (equal to two-sevenths of the said sum) on completion and handing over of each section of the railway to which the certificate may apply.

ART. III. The Government hereby unconditionally undertakes to pay the contractors the compensation as defined in Article I of this agreement and in the manner defined in Article II of this agreement.

ART. IV. If both parties to this agreement agree that the section of the railway from Kweiyang to Shingyifu is impracticable, the Government of the Republic of China undertakes to substitute an equal mileage elsewhere on the same terms and conditions as those set forth in the detailed agreement and in this agreement.

ART. V. On the signing of this agreement the Government shall officially notify the British Minister at Peking of the fact.

ART. VI. This agreement is executed in quadruplicate in English and Chinese, two copies to be retained by the Government, one to be forwarded to the British Minister at Peking, and one to be retained by the contractors. Should any doubt arise as to the interpretation of this agreement, the English text shall be accepted as the standard.

Signed at Peking by the contracting parties on this 25th day of the seventh month of the third year of the Republic of China, being the 25th day of July, nineteen hundred and fourteen.

Appendix 8.—HUKUANG RAILWAYS.

FINAL AGREEMENT.

This agreement is made at Peking on the twenty-second day of the fourth month of the third year of the Emperor Hsuan Tung, corresponding to the twentieth day of May, one thousand nine hundred and eleven, Western Calendar, and the contracting parties are:

His Excellency the Kung-Pao Sheng Hsuan-Huai, Minister of Posts and Communications, duly authorized by imperial decree to act on behalf of the Imperial Government of China, of the one part, and the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine, and Messrs. J. P. Morgan & Co., Messrs. Kuhn, Loeb & Co., the First National Bank, and the National City Bank, all of New York, constituting the American Group, hereinafter called the "banks," of the other part, witnesseth as follows:

ARTICLE I. The Imperial Government of China authorizes the banks to issue a 5 per cent gold loan for an amount of £6,000,000 sterling. The loan shall be of the date on which the bonds are issued to the public, and shall be called "The Imperial Chinese Government 5 Per Cent Hukuang Railways Sinking Fund Gold Loan of 1911."

ART. II. This loan is designed to provide capital, first—

For the redemption at a premium of 2½ per cent, with accrued interest, of certain unredeemed gold bonds of the total par value of two million two hundred and twenty-two thousand dollars United States currency (G \$2,222,000) issued by the American China Development Co. on behalf of the Imperial Chinese Government, and secondly—

For the construction of a Government railway main line from Wuchang, the capital of the Hupeh Province, through Yochow and Changsha, the capital of the Hunan Province, to a point in the district of Yichanghsien in the prefecture of Chenchow on the southern boundary of Hunan, connecting with the Kwangtung section of the Canton-Hankow Railway line, the total length of this line, hereinafter known as "The Hupeh-Hunan Section of the Canton-Hankow Railway line," being an estimated distance of 1,800 Chinese li, or 900 kilometers, and of

A Government railway main line from a point at or near Kwangshui in the Province of Hupeh, connecting with the Peking-Hankow Railway line and passing through Hsiangyang, and Chingmenchow to Ichang, an estimated distance of 1,200 Chinese li, or 600 kilometers, and from Ichang to Kweichowfu in the Province of Szechwan, an estimated distance of 600 Chinese li, or 300 kilometers—this latter section of the main line having been added in substitution for the branch line from Chingmenchow to Hanyang originally agreed upon—the total length of this main line, hereinafter known as "The Hupeh Section of the Szechwan-Hankow Railway line," being about 1,800 Chinese li, or 900 kilometers.

The survey lines shall be open to revision by the Ministry of Posts and Communications.

The Chinese Imperial Government undertakes to call in, after having received from the banks application in writing to do so, the aforesaid gold bonds, and the banks will apply the amount necessary for the said redemption out of the proceeds of the loan, and will deliver the redeemed bonds to the Chinese Government after having made the bonds valueless. The Chinese Imperial Government will, after receipt of the redeemed bonds, cancel the inscription of the pledge of the Canton-Hankow Railway line in their archives, and will advise the banks in writing after having done this.

It is understood that any surplus of the nominal amount of £500,000 sterling hereby allotted for the redemption of the gold bonds issued by the American China Development Co., aforesaid, which may remain after complete redemption of those bonds, shall be allotted to the above-named railway lines.

ART. III. After deduction of the amount required for the redemption of the gold bonds referred to in Article II of this agreement, the balance of the loan proceeds shall be solely devoted to the construction of the aforesaid railway lines, including the purchase of land, rolling stock, and other equipment, and to the working of the lines, and to payment of interest on the loan during the period of construction,

which is estimated at three years from the actual beginning of the works, a longer period, however, being allowed for the completion of the section from Ichang to Kweichowfu in consideration of the engineering difficulties to be encountered. Work shall be commenced simultaneously at Wuchang, Changsha, Kwangshui, and Ichang within six months after this agreement has been signed, within which period the banks shall notify the Ministry of Posts and Communications that the sum of £600,000 sterling has been placed at its disposal, in case funds should be required for survey or construction purposes, or for ordering of materials, and for the resumption by the Imperial Chinese Government of the portion of these lines already constructed by the Provinces concerned, the said sum to be held in Europe and/or in the United States of America or remitted to China as the Ministry may direct as a first instalment on account of the proceeds of the loan. This amount of £600,000, or whatever portion thereof is actually advanced, together with interest thereon at the rate of 6 per cent per annum, shall be deducted from the first proceeds of the sale of the bonds.

It is understood that the lines of railway already constructed by the two Provinces of Hupeh and Hunan prior to the signature of this agreement with capital provided by those Provinces themselves, together with the property of those two provincial railways, shall henceforward be taken over by and incorporated in the Canton-Hankow and the Szechwan-Hankow Government Railways Administration, and further that any supplementary funds which may be furnished in the future by the Ministry of Posts and Communications on account of a deficiency in the amount required for the construction of the Canton-Hankow and Szechwan-Hankow main lines within the boundaries of the two Provinces of Hupeh and Hunan, as provided for in Article XV of the present agreement, shall also rank as capital of the Canton-Hankow and Szechwan-Hankow Railway main lines within the boundaries of the two Provinces aforesaid. But the returns due upon such capital shall not in any manner impair the arrangements for payment of interest and repayment of principal of the present loan.

ART. IV. The rate of interest for the loan shall be 5 per cent per annum on the nominal principal, and shall be paid to the bondholders half-yearly. The said interest shall be calculated from the date on which the loan is issued to the public, and shall be paid by the Imperial Chinese Government during the time of construction either from the proceeds of the loan or from other sources, and afterwards, in the first place, out of the revenues of the railways, and then from such other revenues as the Chinese Government may think fit to use for the purpose, in half-yearly instalments according to the amounts specified in the schedule attached to this agreement, and 12 days before their due dates, Western Calendar, as calculated half-yearly from the date on which the loan is issued to the public.

ART. V. The term of the loan shall be 40 years. Repayment of principal shall commence after the expiry of 10 years from the date of the loan and except as provided in article VI hereinafter, shall be made by yearly amortization to the banks in half-yearly instalments out of the revenues of the lines, or such other revenues as the Chinese Government may think fit to use for the purpose, according to the amounts specified in the schedule attached to this agreement, but 12 days before their due dates, Western Calendar, as calculated half-yearly from the date on which the loan is issued to the public.

ART. VI. If at any time after the lapse of 10 years from the date of the loan the Imperial Chinese Government should desire to redeem the whole outstanding amount of the loan or any part of it not yet due for repayment in accordance with the schedule of repayment hereto attached, it may do so up to the end of the seventeenth year by payment of a premium of 2½ per cent on the face value of the bonds, that is to say, by the payment of £102 10s. for each £100 bond, and after the lapse of 17 years without premium: but in each and every case of such extra redemption the Imperial Chinese Government will give six months previous notice in writing to the banks and such redemption shall be effected by additional drawings of bonds to take place on the date of an ordinary drawing as provided for in the prospectus of the loan.

When the loan has been fully repaid this agreement will immediately become null and void. Bonds and interest coupons which have matured will be collected in due order and cancelled by the banks as they are presented for payment and will be delivered by them to the Chinese Ministers in Great Britain, Germany, France, and the United States of America. The banks will refund in full to the Imperial Chinese Government the amounts of any drawn bonds and/or interest coupons which have not been presented for payment within 30 years from the respective due dates for redemption or payment of interest.

ART. VII. The half-yearly payments due for amortization and interest referred to in articles IV and V shall be made in accordance with the amounts of the schedule attached to this agreement, and 12 days before their due dates as fixed by articles IV

and V, in equal share to the banks by the Ministry of Posts and Communications, which shall hand to the banks in Shanghai or in Hankow, 12 days before the said due dates, funds in Shanghai "Kueiyuan" sycee or Hankow "Yang-li" sycee and/or coin of the national currency (so soon as the said currency shall have been effectively established) sufficient to meet such payments in gold in Europe and the United States of America, exchange for which shall be settled with the banks on the same day, the Ministry of Posts and Communications having, however, the option of settling exchange with the banks simultaneously at any date or dates within six months previous to any due date for the payment of interest and/or principal. These payments may, however, be made in gold in Europe and/or in the United States of America 12 days before their due dates if the Imperial Chinese Government should happen to have gold funds bona fide at their disposal in Europe and/or in the United States of America not remitted from China for the purpose, and desire so to use them.

In reimbursement of expenses connected with the payment of interest and repayment of principal of the loan the banks will receive from the Chinese Government a commission of 1 per cent on the annual loan service.

ART. VIII. The Imperial Government of China hereby engages that the interest and principal of this loan shall duly be paid in full and should the revenues of the railways and/or the proceeds of the loan not be sufficient to provide for the due and full payment of interest and repayment of principal, the Ministry of Posts and Communications shall memorialize the Throne and the Imperial Government of China will thereupon make arrangements to ensure that the amount of deficiency shall be met from other sources and handed over to the banks on the date upon which funds are required to complete full payment of interest and repayment of principal.

ART. IX. The present loan of £6,000,000 sterling, together with the second series thereof, provision for the issue of which is made under the terms of article XV hereinafter, is hereby secured, in respect to both principal and interest, as a first charge upon—

1. Hupeh general likin amounting to 2,000,000 Haikwan taels a year.
2. Hupeh additional salt tax for river defence amounting to 400,000 Haikwan taels a year.
3. Hupeh new additional two-cash salt tax of September, 1908, amounting to 300,000 Haikwan taels a year.
4. Hupeh collection of Hukuang interprovincial tax on imported rice, to the amount of 250,000 Haikwan taels a year.
5. Hunan general likin amounting to 2,000,000 Haikwan taels a year.
6. Hunan salt commissioner's treasury regular salt likin to the amount of 250,000 Haikwan taels a year.

The above provincial revenues, amounting to a total of 5,200,000 Haikwan taels a year, are hereby declared to be free from all other loans, charges, or mortgages.

So long as principal and interest of this loan are regularly paid, there shall be no interference with these provincial revenues; but if principal or interest of the loan be in default at due date, then, after a reasonable period of grace, likin and other suitable internal revenues of the Provinces of Hupeh and Hunan sufficient to provide the amounts above stated shall forthwith be transferred to and administered by the Imperial Maritime Customs in the interests of the bondholders. And so long as this loan or any part thereof shall remain unredeemed, it shall have priority, both as regards principal and interest, over all future loans, charges, and mortgages charged on the aforesaid provincial revenues. No loan, charge, or mortgage shall be raised or created which shall take precedence of or be on an equality with this loan, or shall in any manner lessen or impair its security over the aforesaid provincial revenues, and any future loan, charge, or mortgage charged on the said provincial revenues other than the second series of the present loan provided for in article XV aforementioned shall be made subject to this loan, and it shall be so expressed in every agreement for every such future loan, charge, or mortgage.

After redemption of the existing gold bonds referred to in article II of this agreement it is understood and agreed that, so long as this loan is unredeemed, the railways shall, under no circumstances, be mortgaged nor their receipts given as security to any other party.

In the event of the Chinese Government, during the currency of this loan, entering upon definite arrangements for the revision of the Customs tariff, accompanied by stipulations for the decrease or abolition of likin, it is hereby agreed, on the one hand, that such revision shall not be barred by the fact that this loan is secured by likin and provincial revenues, and, on the other hand, that whatever likin is required to provide the security of this loan shall neither be decreased nor abolished except by previous arrangement with the banks and then only in so far as an equivalent is substituted for it in the shape of a first charge upon the increase of customs revenue consequent upon such revision.

ART. X. The banks are hereby authorized to issue to the subscribers to the loan bonds for the total amount of the loan in gold, for such amounts as may appear advisable to the banks. The form and language of the bonds shall be settled by the banks in consultation with the Ministry of Posts and Communications or the Chinese Minister in Berlin, London, Paris, or Washington: they shall bear the facsimile of the signature of the Minister of Posts and Communications and of his seal of office, in order to dispense with the necessity of signing them all in person, and the Chinese Minister in Berlin and/or London and/or Paris and/or Washington, at the option of the banks, shall, previous to the issue of the bonds, put his seal upon each bond, with a facsimile of his signature, as a proof that the issue and sale of the bonds are duly authorized by and binding upon the Imperial Chinese Government. The representatives of the banks in Berlin, London, Paris, or New York, as the case may be, shall countersign the bonds as agents for the issue of the loan.

In the event of any bond or bonds issued for this loan being lost, stolen, or destroyed, the group and/or bank or banks concerned shall immediately notify the Ministry of Posts and Communications and the Chinese Minister in Berlin, London, Paris, or Washington, as the case may be, who shall authorize the group and/or bank or banks concerned to insert an advertisement in the public newspapers notifying that payment of such bond or bonds has been stopped, and to take such other steps as may appear advisable or necessary according to the laws and customs of the country concerned, and should any bond or bonds be destroyed or should such lost or stolen bond or bonds not be recovered after a lapse of time to be fixed by the group and/or bank or banks concerned the Chinese Minister in Berlin, London, Paris, or Washington, as the case may be, shall seal and execute a duplicate bond or duplicate bonds for a like amount and hand the same to the group and/or bank or banks representing the owner or owners of such lost, stolen, or destroyed bond or bonds, which group and/or bank or banks shall pay all expenses in connection with such delivery and execution of such bond or bonds for the account of the owner or owners of such bond or bonds.

ART. XI. All bonds and coupons and payments made and received in connection with the service of this loan shall be exempt from all Chinese taxes and imposts during the currency of this loan.

ART. XII. All details necessary for the prospectus and connected with the payment of the interest and repayment of the principal of this loan, not herein explicitly provided for, shall be left to the arrangement of the banks in consultation with the Chinese Ministers in Berlin, London, Paris, and Washington. The banks are hereby authorized to issue the prospectus of the loan as soon as possible after the signing of this agreement; and the Imperial Government will instruct the Chinese Ministers in Berlin, London, Paris, and Washington to cooperate with the banks in any matters requiring conjoint action, and to sign the prospectus of the loan.

ART. XIII. This loan of £6,000,000 sterling shall be issued to the public in one amount as soon as possible after the signature of this agreement, and not later than 12 months from the date thereof. The price of the bonds to the Imperial Chinese Government shall be 95 per cent of their nominal value. Subscriptions will be invited by the banks in Europe, in the United States of America, and in China from Chinese, Europeans, and Americans on equal conditions, preference being given to the application of the Chinese Government, provided such application be made not less than four days before the issue of the prospectus to the public. Seven days' notice of the issue of the prospectus will be given by the banks to the Imperial Chinese Government.

ART. XIV. The proceeds of the loan shall be placed to the credit of a "Hukuang Government Railways Account" with the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, and the Banque de l'Indo-Chine in China, Berlin, London, or Paris, as the case may be, and with the American Group in New York or such banks in China as from time to time shall be designated by the American Group, the International Banking Corporation being now so designated. Payments of the loan proceeds into the credit of this account shall be made in installments and on dates conforming to the conditions allowed to the subscribers to the loan.

Interest at the rate of 3 per cent per annum shall be granted on the credit balance of the portion of this account kept in Berlin, London, Paris, or New York, and interest on the credit portion kept in China by the above banks will be allowed at the banks' rate for current accounts to be arranged.

Subject to the payments and deductions to be made from the loan proceeds in terms of articles II and III of this agreement the banks will hold the net balance with accrued interest to the order of the Ministry of Posts and Communications.

Transfers of the loan funds to China in amounts not exceeding £200,000 sterling transferred in any one week, will be made by the Ministry of Posts and Communications at its discretion, the transfers being effected through the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine and/or the

bank or banks to be designated by the American Group, the International Banking Corporation being now so designated.

Transfers of the loan funds to China from the banks in Europe and America, and transfers from the banks in China to the Chinese banks which are hereinafter designated shall be made as nearly as possible in equal amounts from each of the banks, the rate of exchange for each transfer from Europe and America being settled simultaneously with the transferring banks either on the day on which such transfer is to be made, or at the option of the Ministry of Posts and Communications, on any date or dates within six months previous to the day on which the transfer is to be made. In the event of equal transfers being found to be impracticable, a mutually satisfactory procedure for making the transfers above referred to shall be arranged between the Ministry of Posts and Communications and the banks.

The transferred funds, to the extent of one-half of the net balance of the loan proceeds above referred to, may, at the discretion of the Ministry of Posts and Communications, be deposited in a Hukuang Government Railways Account with the Bank of Communications (Chiao-Tung Bank) and/or with the Ta-Ching Government Bank, which banks have been designated by the Ministry of Posts and Communications as its agents for this purpose, and the Imperial Chinese Government hereby declares itself responsible for all the funds of this loan deposited with the said Chinese banks.

The Ministry of Posts and Communications shall from time to time make transfers from the loan funds held in China by the banks and by the designated Chinese banks to the credit of a construction account for the Hupeh section of the Szechwan-Hankow Railway Line with the Deutsch-Asiatische Bank and of a construction account for the Hupei-Hunan section of the Canton-Hankow Railway Line with the Hongkong and Shanghai Banking Corporation, in amounts sufficient to cover one month's construction estimates in advance, so as to insure the uninterrupted continuance of construction. The Ministry of Posts and Communications shall hand to the banks, for the information of the auditors (hereinafter referred to), quarterly statements of the loan funds held on deposit by the aforesaid designated Chinese banks, and these funds shall not be withdrawn from the said banks except for the purpose of transfer to the construction accounts above named. Funds shall be drawn from these construction accounts in sycee by the managing director as hereinafter provided, and it will rest with the managing director under the instructions of the Ministry of Posts and Communications to make all necessary arrangements for the distribution of such funds through Chinese banks or otherwise to the points where they are required.

Requisitions upon these construction accounts will be drawn in amounts to suit the progress of construction of the railway lines by orders upon the Deutsch-Asiatische Bank or the Hongkong & Shanghai Banking Corporation signed by the managing director of the lines concerned or, in his absence, by his duly authorized representative, who shall moreover, two days previous to the presentation of such order, issue in duplicate a certificate stating clearly the object for which the funds are to be drawn, handing one copy to the auditor concerned (hereinafter referred to) and one copy to the bank concerned. If the auditor should find that there are irregularities in the payments to be made, he may in the first place ask the managing director for specific explanations, and if the managing director is unable to furnish definite explanations, the auditor may refer the matter to the Ministry of Posts and Communications for its instructions.

The accounts of the railways shall be kept in Chinese and English in accordance with accepted modern methods, and will be supported by all necessary vouchers. During the period of construction the said accounts and vouchers will be open at any time to the inspection of two auditors for the Hupeh-Hunan section of the Canton-Hankow Railway Line, and the Hupeh section of the Szechwan-Hankow Railway Line, respectively, appointed and paid by the banks, whose duty it will be to satisfy the banks as to the due expenditure of the loan funds in accordance with the provisions of article III of this agreement, and to certify to monthly statements of the foreign materials purchased by the Railway Administration under the provisions of article XVIII hereinafter. The Railway Administration will publish annually upon the close of its financial year a report in the Chinese and English languages, showing the working accounts and traffic receipts of the railways, which report shall be procurable by the public on application.

ART. XV. If after the deduction of the amount required for the redemption of the gold bonds referred to in article II of this agreement, and of the sums necessary for the service of interest on the loan during the time of construction, the balance of the loan proceeds, with accrued interest, should not be sufficient to complete the construction and equipment of the railway lines named in article II of this agreement, the amount of deficiency shall be provided, in the first place, from such Chinese funds as may be available so as to permit of the uninterrupted continuance of the work of construction, and any balance then uncovered shall be supplemented by the issue

by the banks, under the terms of the present agreement, of a second series of the present loan, for an amount not exceeding £4,000,000 sterling. This second series shall be secured *pari passu* as an equal charge in every respect on the internal revenues specified in article IX of this agreement, and the time of its issue shall be left to the discretion of the banks. Should foreign capital still be required for the completion of the railway lines aforesaid it shall be provided by a further loan to be issued by the banks on terms to be arranged. If after the completion of the lines there should be a balance at the credit of the railways account, such unused balance will be transferred to the credit of the interest reserve fund, hereinafter mentioned in article XX, as a provision for payments for which the Imperial Chinese Government is responsible under this agreement, or will be devoted, if necessary, to the improvement of these railways or otherwise to their advantage.

ART. XVI. If before the publication of the prospectus for the issue of the loan any political or financial crisis should take place by which the markets and the prices of existing Chinese Government stocks are so affected as to render, in the opinion of the banks, the successful issue of this loan impossible on the terms herein named, the banks shall be granted a reasonable extension of time for the performance of their contract. If within this time limit, to be arranged, the loan shall not have been issued, then this contract shall become null and void, and any advances made by the banks under the provisions of article III of this agreement, shall be repaid by the Chinese Government with accrued interest, but without any other compensation or remuneration whatsoever.

ART. XVII. The construction and control of the railway lines shall be entirely and exclusively vested in the Imperial Chinese Government. For the work of construction the Imperial Chinese Government will select for appointment a fully qualified British engineer in chief for the Hupeh-Hunan section of the Canton-Hankow railway line from Wuchang to Yichanghsien, and a fully qualified German engineer in chief for the Kwangshui-Ichang section of the Szechwan-Hankow railway line, with a fully qualified American engineer in chief for the section of that line from Ichang to Kweichowfu, at the same time informing the banks of the selection made. If the banks have objections to offer against the engineers in chief thus selected for appointment, they shall, in stating their objections, give definite reasons therefor. The said engineers in chief shall be under the orders of the director general and the managing directors of the respective lines or, in their absence, of their duly authorized representatives, and will carry out all the wishes of the Ministry of Posts and Communications with regard to the plan and construction of the lines. In their general conduct they shall pay all due respect to the Ministry of Posts and Communications, the director general, and the managing directors. The terms of their respective agreements will be arranged by the Ministry of Posts and Communications.

Whenever appointments are to be made or functions defined of the technical members of the railway staff, as well as in the case of their dismissal, the director general, the managing director or, in his absence, his duly authorized representative, will act in consultation with the engineer in chief concerned, and in the case of disagreement the matter will be referred to the Ministry of Posts and Communications, whose decision shall be final.

After completion of construction, and during the currency of this loan, the Imperial Chinese Government will continue to employ Europeans and/or Americans as engineers in chief of the said railway lines, these appointments being made without reference to the banks.

ART. XVIII. For the Hupeh-Hunan section of the Canton-Hankow railway line, and the Hupeh section of the Szechwan-Hankow railway line, respectively, (a) The British & Chinese Corporation (Ltd.), and (b) the Deutsch-Asiatische Bank will act as agents of the Railway Administration during construction for the purchase of all materials, plant, and goods required to be imported from abroad. From this category rails and their accessories are excepted; for the purchase of which the Ministry of Posts and Communications has memorialized the Throne recommending that they should be manufactured and supplied by the Hanyang Iron Works. Their price will be settled by the Ministry of Posts and Communications with the Hanyang Iron Works, after comparison with the current quotations for rails purchased by other lines from Europe or America. No delay will be allowed, and it is understood that if the Hanyang Iron Works are unable to supply the requirements of the lines in question in such manner as to insure uninterrupted construction, the purchasing agents will be instructed to procure from abroad the additional supplies required. For all important purchases of materials tenders shall be called for by the director general or the managing director concerned; in the case of all tenders, indents, and orders for the importation of goods and materials from abroad, the said agents shall purchase the materials required on the terms most advantageous to the railways, and shall charge the original net cost of the same, plus a commission of 5 per cent. It is understood

that no orders for materials shall be executed or any expenditure incurred without due authorization by the managing director concerned.

In return for payment of commission as above stated the British & Chinese Corporation (Ltd.) and the Deutsch-Asiatische Bank as agents for the respective railway lines, shall be prepared to superintend the purchase of all foreign materials required for their construction and equipment, which shall be purchased in the open market at the lowest rate obtainable, it being understood that all such materials shall be of good and satisfactory quality and that the aforesaid agents will avail themselves of the services of engineering experts to be selected by the Ministry of Posts and Communications for the inspection of such materials. The fees of these inspectors shall be borne in equal shares by the Ministry of Posts and Communications and the purchasing agents. At equal rates and qualities goods of British, French, German, and American manufacture shall be given impartial preference over other goods of foreign origin. The Railway Administration of the Ministry of Posts and Communications reserves the right, while paying the above stipulated commission to the said agents in respect of all purchases of foreign materials, to avail itself of the services of other agents in China, or abroad, should it see fit to do so.

The most favorable shipping and insurance rates are to be secured and statements thereof together with original invoices and inspectors' certificates are to be submitted to the director general and the managing director concerned; all return commissions and rebates of every description shall be credited to the railways, and all purchases made by the agents on behalf of the railways shall be supported by manufacturers' original invoices and inspectors' certificates. No commission shall be paid to the agents except as above provided; but it is understood that the Railway Administration shall provide out of railway funds for the remuneration of consulting engineers whenever their services are engaged.

With a view to the encouragement of Chinese industries, preference will be given, at equal prices and qualities, over British, French, German, American, or other foreign goods to Chinese materials and goods manufactured in China, such cases being left to the decision, in consultation with the engineers in chief, of an inspector appointed by the Ministry of Posts and Communications. No commission will be paid on purchases of such Chinese materials and goods.

It is understood and agreed that, after the construction of the lines is completed, the British & Chinese Corporation (Ltd.) and the Deutsch-Asiatische Bank will be given the preference for agency business for the respective lines, during the currency of the loan, for the supply of foreign materials which the Railway Administration may require, on terms to be hereafter mutually agreed upon.

ART. XIX. Should the Imperial Chinese Government itself hereafter consider it desirable to construct extensions in connection with the railway lines named in article II of this agreement in order that the interests of the country may be better served, such extensions shall be built by the Imperial Chinese Government with funds at its disposal from Chinese sources, but if foreign capital is required, and the terms offered by the banks are as favorable as those offered by others preference will be given to the banks.

ART. XX. After payment of interest and repayment of principal of this loan for any current year, the Railway Administration will deposit with the banks in Shanghai or Hankow any surplus of the net revenue of the railway lines for that year up to the amount required to pay the following year's installments of interest on the loan, the rate of interest on the deposit being arranged with the banks from time to time with due regard to the conditions of the market.

ART. XXI. All expenses in connection with the flotation and issue of this loan, such as underwriting, commission and brokerage, telegraph charges, advertising, postage, engraving and printing of prospectus and bonds, stamp and legal fees, shall be borne by the banks.

ART. XXII. The Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine, and the American Group shall take the loan in equal shares and without responsibility for each other.

ART. XXIII. The Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine, and the American Group may, subject to all their obligations under this agreement, transfer or delegate all or any of their rights, powers, and discretions hereunder to any German, British, French, or American company, directors, or agents, with power of further transfer and subdelegation; such transfer, subtransfer, delegation, or subdelegation to be subject to the approval of the Ministry of Posts and Communications.

ART. XXIV. This agreement is signed under the authority of an imperial edict dated the twenty-second day of the fourth month of the third year of the Emperor Hsuan Tung, corresponding to the twentieth day of May, 1911, Western Calendar,

which will be officially communicated to the Ministers of Great Britain, France, Germany, and the United States of America in Peking by the Waiwupu.

ART. XXV. Eight sets of this agreement are executed in English and Chinese, four sets to be retained by the Imperial Chinese Government and four sets by the banks. In the event of any doubt arising regarding the interpretation of the contract the English text shall rule.

Signed at Peking by the contracting parties this twenty-second day of the fourth month of the third year of the Emperor Hsuan Tung, corresponding to the twentieth day of May, one thousand nine hundred and eleven, Western Calendar.

The Minister of Posts and Communications,

SHENG HSUAN-HUAI.

For the Deutsch-Asiatische Bank,

H. CORDES.

For the Hongkong & Shanghai Banking Corporation,

E. G. HILLIER,
Agent.

Banque de l'Indo-Chine,

R. SAINT PIERRE CASENAVE.

For J. P. Morgan & Co.,

Kuhn, Loeb & Co.,
The First National Bank,
The National City Bank,
of New York,
constituting
"The American Group,"

WILLARD STRAIGHT,
Representative.

DISPATCH FROM THE MINISTER OF COMMUNICATIONS.

PEKING, March 1, 1913.

To the Representatives of

The Deutsch-Asiatische Bank,
The Hongkong & Shanghai Banking Corporation,
The Banque de l'Indo-Chine,
and The American Group.

GENTLEMEN: I duly received the letter of the representatives, dated the 11th of July last, in which were submitted four points for discussion. I beg to state that frequent discussions have already taken place and that nearly half a year has elapsed since our joint discussion of the 28th of September. A solution has not yet been arrived at. Construction work is in abeyance for lack of funds. Both parties agree that no further delay should occur.

We have mutually agreed that this Ministry shall address a dispatch to you setting forth a method of procedure and I would request that you will assent thereto and favor us with a reply so that funds to meet requirements may be speedily made available.

The method of procedure decided upon, under four headings, is as follows:

1. It has already been arranged that the Szechwan Commercial Railway shall be taken over and operated by the Government. The Commercial Railway line of the Canton-Hankow Railway in Hunan has already been taken over by Director General Huang in Hunan. The survey of the Canton-Hankow Railway in Hupeh is nearing completion and arrangements have been made for commencing work at the Wuchang end. The German engineer in chief and the American engineer in chief have already been appointed and before many days will proceed to make the survey of their respective sections. The above may all be considered as a simultaneous commencement of work on the four railway lines.

2. According to the terms of article 14 of the loan agreement one-half of the proceeds of the loan funds transferred to China shall be deposited with the Chiao-Tung Bank or with Ta-Ching Bank. It is now agreed that the funds transferred to China shall be temporarily deposited with the Deutsch-Asiatische Bank, the Hongkong & Shanghai Banking Corporation, the Banque de l'Indo-Chine, and the International Banking Corporation, designated by the American Group, in readiness to be drawn upon from time to time as required for the work until such time as either the Chiao-Tung Bank or the Ta-Ching Bank has been reorganized as the State Bank of China and has estab-

lished its credit, and business relations with foreign banks have been mutually resumed. When such time comes the Government may consult with the groups as to a reversion to the method of procedure laid down in article 14 of the loan agreement, by which the deposits of the proceeds of the loan funds shall be shared with the Chiao-Tung Bank or the State Bank of China as agents.

3. For the purpose of now removing the bondholders' apprehensions that the amount of the likin specified in the agreement as security may have been decreased, the property and materials of the railway are hereby specially given as a provisional guaranty that the likin is unimpaired. Excepting this, all other conditions should be carried out in accordance with the loan agreement. In the future whenever the Chinese Government is able to demonstrate that the likin is not only unimpaired, but assignable by the central Government, or to find some other suitable security, then the said guaranty of the security shall be immediately canceled and annulled and it shall be unnecessary to substitute this with any other guaranty. In the event of the Chinese Government drawing up new regulations consequent upon the abolition of likin the same shall be carried out in accordance with article 9 of the loan agreement.

4. By article 14 of the loan agreement auditors are to be engaged by the banks for the inspection of the accounts. Their duty, as a matter of course, will be to investigate, to consult, and make enquiries. They should therefore be in constant attendance at the Railway Accounts Office, so that they may be closely connected and acquainted with the affairs relative to their office, and they shall continue to function during the time of construction and so long afterwards as the mortgage of the railway, referred to in heading No. 3 of this letter, shall remain in force. In case of doubt as to the employment of loan funds or of any railway revenues, then the auditors are empowered to suspend payment of requisitions until satisfactory explanations are received by them from the managing director and/or the director general. It has already been decided that railway accounts shall be kept in Chinese and English in accordance with modern methods. China, actuated by the desire to have accounts kept so that they shall be clear for auditing, will herself forthwith engage experienced foreign accountants whose executive power and appointment to the various railway sections shall be entirely and exclusively controlled by the director general. The director general shall have the sole power of engaging or dismissing the accountants. These appointments are made by the Chinese Government and have no concern whatever with the loan agreement.

With regard to the control of the railway material during the time of construction it is necessary to make proper arrangements. The managing director and the engineer in chief should select a foreign engineer to be stationed at the store yards to control, supervise, and keep records and in the event of damage, loss, or misuse the managing director and the engineer in chief shall be responsible.

The above points having been mutually determined upon verbally, I have to request that you—the representatives—will promptly reply and proceed to carry out the agreement and thus avoid further loss upon the part of the railways.

With compliments, etc.

CHU CHI-CHIEN,
Minister of Communications.

REPLY OF THE BANKS.

PEKING, March 3, 1913.

To the Honorable Mr. CHU CHI-CHIEN,
Minister of Communications.

SIR: We have the honor to acknowledge receipt of your letter of the 1st instant setting forth under four headings the procedure which has been agreed upon for carrying out the purposes of the Hukuang Railways loan agreement [the four headings outlining the method of procedure are here repeated].

In reply we have the honor to state that we are now prepared to arrange for the transfer of loan funds to China for purposes of survey and/or construction in amounts as may be necessitated by the progress of the work.

Arrangements are now being made for the engagement of auditors in terms of the loan agreement, and pending their appointment we are prepared to designate members of our banks' staffs in Hankow to act provisionally as auditors for the Hupeh-Hunan section of the Canton-Hankow line and the Hupeh section of the Hankow-Szechwan line respectively.

We shall be glad to learn from you as soon as possible the names of the foreign accountants whom it is the intention of the Chinese Government to engage in accordance with the provisions of heading No. 4 above.

We have the honor to be, Sir,
Your obedient servants,

For the Hongkong & Shanghai Bank,
E. G. HILLIER.
For the Deutsch-Asiatische Bank,
H. CORDES.
For the Banque de l'Indo-Chine,
R. SAINT PIERRE CASENAVE.
For The American Group,
F. H. MCKNIGHT.

MEMORANDA OF SEPTEMBER 12, 1913.

DIRECTOR-GENERAL FENG TO REPRESENTATIVES OF THE FOUR GROUPS.

PEKING, 12th September, 1913.

GENTLEMEN: I have the honor to acknowledge the receipt of your letter of September 4 with reference to the omissions to be made in the draft memorandum of September 3, Article IV, paragraph (e), and in the annex, Article II.

It has now been agreed to omit the whole of the two clauses above mentioned. I intend upon my return to Hankow immediately to embody the terms of the two said clauses in the departmental regulations.

The two clauses in question read as follows:

MEMORANDUM I, ARTICLE IV, PARAGRAPH (E) (DRAFT OF 3D SEPTEMBER).

"The mode of transmitting all funds required by the engineer in chief for his district engineers for survey or construction expenditure shall be settled by the managing director, in consultation with the foreign accountant concerned, with due regard to their safe, economical, and speedy transmission, full consideration being given to the recommendations of the engineer in chief.

"The district engineers shall receive, take charge of, and account for all funds sent to their districts."

MEMORANDUM II, ARTICLE 2 (DRAFT OF 3D SEPTEMBER).

"District engineers will have charge of all stores and materials in their districts, and will be authorized to call for tenders where necessary for construction work and to submit the same with their recommendations to the engineer in chief for selection. The engineer in chief will submit his selection to the managing director for approval and sanction, which decision will be given with all possible dispatch in order to avoid delay in construction."

I have the honor to be, gentlemen,
Your obedient servant,

FENG YUAN TING.

PEKING, 12th September, 1913.

To the Hongkong and Shanghai Banking Corporation,
The Deutsch-Asiatische Bank,
The Banque de l'Indo-Chine, and
The American Group.

SIRS: With reference to the memorandum of procedure for transfer and expenditure of funds and auditing of accounts in five articles with the annex regarding construction and purchase of material in two articles, for the Hukuang Railways, as agreed to in our meetings, I beg to enclose you herewith copies of these memoranda for your information and acceptance, and shall be glad to be favored with your reply confirming the same.

I am, sirs, your obedient servant,

FENG YUAN TING.

PEKING, 12th September, 1913.

The Honorable Mr. FENG YUAN TING,
Director General Hankow-Canton and Hankow-Szechwan Railways.

SIR: We have the honor to acknowledge receipt of your letter of to-day's date, inclosing for our information and acceptance copy of the memorandum of procedure

for transfer and expenditure of funds and auditing of accounts, in five articles, with the annex regarding construction and purchase of materials in two articles for the Hukuang Railways, as agreed to in our meetings.

In reply, we have the honor to confirm our acceptance of the same.

We have the honor to be, sir,

Your obedient servants,

For the Hongkong and Shanghai Banking Corporation,
E. G. HILLIER,
Agent.

For the Deutsch-Asiatische Bank,
A. J. EGGELING.

For the Banque de l'Indo-Chine,
R. ST. PIERRE.

For the International Banking Corporation,
D. A. MENOCAL,
Manager on behalf of the American Group.

MEMORANDUM OF PROCEDURE FOR THE TRANSFER AND EXPENDITURE OF FUNDS.

In order to put into operation the terms of the letters of agreement of March 1 and 3, 1913, the following rules of procedure for the transfer and expenditure of funds in five clauses and the annex thereto regarding construction and purchase of materials in two clauses have been agreed upon.

1. In the second half of each month estimates of construction and administrative expenditure for the following month shall be made out by the foreign accountants of the sections concerned, based upon the forecasts (vide also memorandum regarding construction, etc.) supplied to them by the managing director and engineer in chief concerned (signed copies of which forecasts are to be attached thereto). Each estimate will be accompanied by a statement prepared and signed by the foreign accountant concerned, showing—

(a) Available balance at the credit of the construction account concerned on date of report.

(b) Actual cash balance of all imprest accounts.

(c) Approximate expenditure until the end of the current month.

(d) Gold balances of the Hukuang Government Railways accounts in Europe and/or America.

2. Funds can not be expended for any purposes other than those for which they were requisitioned in the estimate. Should it be found that additional funds are required for unforeseen contingencies during any month, such funds must be requisitioned for under a supplementary estimate, to be dealt with in accordance with the ordinary procedure for monthly requisitions.

3. The monthly estimates and statements above mentioned shall be submitted for sanction before the 20th of every month to the director general of the railways in Hankow, who has been duly empowered by the Ministry of Communications to act as its representative, and copies will be forwarded in due course to the bank and auditors concerned.

After the director general has sanctioned these estimates and statements and after they have been passed with all due dispatch by the auditor concerned, the director general will direct the banks to transfer to China an equivalent amount from the loan funds to be credited to the construction account concerned.

It is understood that the provisions of article 14, paragraph 5, of the loan agreement for the forward settlement of exchange still holds good, subject always to the amounts settled being based upon approximate monthly forecasts by the departments concerned.

4. Funds having passed into construction account are then available for expenditure in accordance with the following procedure devised to meet the conditions of the loan agreement, article 14, paragraph 9, and the letters of agreement of 1st and 3d March, which require that "the accounts of the railways shall be kept in English and Chinese in accordance with accepted modern methods," and that "they shall be clear for auditing."

(a) All bills and pay sheets must be certified by the heads of the departments concerned, and initialled and chopped as correct by the foreign accountant before they can be paid, with the exception of payments under clause 5 of this memorandum and of the expenditure incurred by district engineers from their imprest accounts.

(b) Wherever practicable, payments must be effected by checks; where payment by check is not practicable such payment will be made in cash by the cashier from an imprest account to be furnished to him by the foreign accountant.

(c) The cashier will keep a cash book for recording all payments made by him. At the close of each day he will hand to the foreign accountant a copy of his cash account for the day, accompanied by all vouchers for entry in the cash book kept by the foreign accountant, together with a statement of his balance, and will, if desired, produce his cash for inspection by the auditor.

(d) All checks shall be prepared by the foreign accountant and shall be certified as correct by his signature. He will then present them, together with the relative documents, to the managing director for his approval and signature.

After the managing director has signed the checks they will remain in the charge of the foreign accountant who will be responsible for the safe delivery of the checks or their proceeds to the payees.

(e) Funds required for land purchase as shown in the engineer-in-chief's monthly forecast shall be paid by check to the Land Office in amounts to meet immediate requirements, and the relative land transfer certificates must be sent by the managing director without delay to the foreign accountant for comparison and entry.

5. The expenditure of the director-general's establishment will be a fixed monthly sum of \$15,000 to be paid against the receipt of the director-general.

The salaries and allowances of the managing director's establishment, not including the foreign accountant's department, shall also be a fixed monthly sum to be arranged from time to time with the auditor concerned, and to be approved by the director general.

This amount will be paid against the receipt of the managing director.

MEMORANDUM REGARDING CONSTRUCTION AND PURCHASE OF MATERIALS.

1. In order to secure efficiency of construction of the railways, which at present form the sole security for the loan, all executive work comprised under the ten main heads of the form of monthly forecast approved by the director general and attached hereto, will be carried out by the engineer in chief, and all orders for the purchase of materials shall be prepared by him, subject always to the authority and approval of the managing director.

2. In the case of all orders for the purchase of materials (except Chinese materials and goods manufactured in China on which no commission is chargeable) copies of requisitions relating thereto shall be handed to the purchasing agents without delay in order to enable them to make the necessary arrangements for calling for tenders or placing the orders on the open market, under the terms of article 18 of the loan agreement.

PEKING, 12th September, 1913.

Appendix 9.—SSUPINGKAI-CHENGCHIATUN RAILWAY.

AGREEMENT FOR CONSTRUCTION.¹

[Translation of the Chinese text.]

This agreement is made at Peking on the 29th day of December, 1915 (4th year of the Republic, according to the Chinese chronology, and 4th year of Taisho, according to the Japanese chronology).

The Chinese Government (hereinafter called the Government), represented by the Minister of Finance and the Minister of Communications, of the one part, and the Yokohama Specie Bank (hereinafter called the Bank), of the other part, have concluded between themselves the present agreement on the basis of the agreement in principle which was arranged between the Chinese and Japanese Governments on October 5, 1913 (2d year of the Republic, according to the Chinese chronology, and 2d year of Taisho, Japanese chronology).

ARTICLE 1. The Government authorizes the bank to issue a 5 per cent gold loan in the sum of 5,000,000 yen. The loan will bear the date of the day of issue, and will be known as the Chinese Government 5 per cent Loan for the Building of the Ssupingkai-Chengchiatun Railway.

ART. 2. The present loan is for the building of a railway from Ssupingkai to Chengchiatun. After the completion of a survey, the route will be fixed by the director general of the road and the bank, and submitted to the Ministry of Communications for approval.

ART. 3. The capital obtained from the loan above mentioned is set apart exclusively for the building of the road, including the payment for the expropriation of land, acquiring rolling stock and other necessary equipments (or materials), and also expenses for the operation of the road and for the payment of interest on the present loan during the period of construction of the said road.

The work must be started not later than six months after the signing of this agreement, and must be finished, if possible, within two years of the day of starting the same. Before the end of six months the bank will place at the disposition of the director general of the road a sum not to exceed 200,000 yen as an advance upon the loan, which money will be deposited in Japan or remitted to China in accordance with the instructions of the director general. The sum so advanced, together with the interest which will be charged on the account at a rate not over 7 per cent per annum, will be withheld by the bank from the proceeds of the first bonds issued. The advance will be paid in Shanghai taels.

ART. 4. The interest on the present loan will be calculated at the rate of 5 per cent per annum on the nominal value of the bonds from the day of issue of the loan, and the payment of interest to the bondholders will be made semiannually. During the period of the building of the road, the Government will pay the interest either from the principal of the loan or from other sources, at its discretion, and when the building is finished the interest will be paid first from the revenue of the road and thereafter from other State revenues at the discretion of the Government. Interest, which as above stated will be computed from the day the loan was issued, will be payable 14 days in advance of the expiration of each half-yearly term in accordance with the amortization table annexed to the agreement.

ART. 5. The term of the loan shall be 40 years. The amortization of the principal shall begin from the eleventh year from the day of issuing the loan, and shall be carried out by means of half-yearly installments, 14 days in advance, in accordance with the amortization table (except in the case anticipated in the sixth article of the agreement), and will be paid from earnings of the road or from other Government revenues at the discretion of the Government.

ART. 6. The Government reserves to itself the right, upon notice to the bank in writing six months in advance, beginning with the eleventh year after the issue of the loan, to pay off, if it desires, before maturity, all or part of the principal, which has not been amortized, upon condition that the holders of the bonds are to be paid

a premium at the rate of 2½ per cent above the par value of the bonds, that is, upon each bond of 100 yen will be paid 102 yen 50 sen. At the end of the twentieth year after the day of issue of the loan, the Government may increase the amounts of the amortization payments, without paying a premium over and above the par value. Such payments before maturity will be carried out by means of a supplementary drawing of bonds upon the days fixed in the prospectus of the loan for the usual drawings.

ART. 7. The Government binds itself to make the payments of the interest and principal of this loan, in accordance with articles 4 and 5 of this agreement, to the bank through the director general, according to the attached amortization table, but 14 days in advance. For payments to be made before maturity in accordance with article 6, the Government likewise engages to make the required payments 14 days in advance. All of the above-mentioned payments are to be made by the Government to the bank at Shanghai, in Shanghai taels (or in new Government money, if such has been introduced into circulation) at the current rate of Japanese exchange. The rate of exchange will be arranged by agreement with the bank either on the day of payment or, as the Government may prefer, on any day not more than six months previous to the day of payment. The Government shall have the right to make such payments in gold if they have such funds in Japan (upon condition, however, that those gold funds shall not have been acquired especially for the purpose of making this payment), and such payment in gold must also be made 14 days in advance. For its services in making the payments upon the present loan the bank will receive a commission at the rate of ¼ per cent on all payments effected through it.

ART. 8. The Government guarantees the regular payment both of the interest and of the principal. In case the amount of the loan or the revenue from the road shall not be sufficient for the above-mentioned payments, the Government will adopt the necessary measures to insure these payments from other sources, which payments must also be effected 14 days in advance of the stated term.

ART. 9. The present loan is secured upon all movable and immovable property belonging to the railway, or which may belong to it in the future, and also upon the revenues of the road. In case a supplementary loan is concluded according to clause 1 of article 15 of this agreement, the said property and revenues of the road will also serve as security for such supplementary loan. The security of this loan may not be pledged for any loan other than as above stated.

ART. 10. The bank has the right to issue bonds for the full amount of the loan, and the nominal value of the bonds will be determined by the bank. The form of the bonds will be determined by the bank in agreement with the Minister of Communications or with the Chinese Minister at Tokyo. The bonds shall be printed in the Chinese and Japanese languages, and the signature of the Minister and the seal of the Ministry of Communications shall be engraved thereon. Previous to the issue of the bonds, the signature and the seal of the Chinese Minister at Tokyo shall be engraved on each as proof that the issue has been effected with the permission of the Government and under its responsibility. The bonds will also be signed by the representative of the bank. If bonds are lost, damaged, or stolen, the bank will immediately notify the Minister of Communications or the Chinese Minister in Japan, who shall authorize it to advertise in the press that payments upon the same will not be made, and also to take the necessary measures in conformity with the laws of the said country. If the lost bonds are not discovered before the date fixed by the bank, the Minister of Communications or the Chinese Minister at Tokyo will deliver to the bank duplicate bonds with the proper signature and seals, and all expenses for printing these bonds will be borne by the bank.

ART. 11. During the whole currency of the loan, the bonds and coupons, and also all operations connected with the payment of the principal and interest, will be exempted from Chinese taxation.

ART. 12. All details in regard to the publication of the prospectus of the loan and the payment of the principal and interest, not set forth in this agreement, shall be determined by the bank upon agreement with the Chinese Minister at Tokyo. The bank is authorized to issue the prospectus within the shortest possible time after the signing of this agreement (observing the reservation in article 13 of this agreement). The Chinese Minister at Tokyo shall be instructed to sign the prospectus of the loan and also to cooperate with the bank in all questions touching on the issue of the loan.

ART. 13. The bank shall have the right to issue the entire loan either at one time or in several series, depending upon the cost of the work, and its satisfactory execution, and also upon the condition of the money market. The Government shall receive for the bonds the issue price less a deduction of 5½ per cent of their nominal value, which will be retained by the bank as indemnification for the expense of issuing the loan.

ART. 14. The proceeds of the loan shall be deposited to the credit of the railway in the Yokohama branch of the bank at the times indicated in the prospectus of the loan for the subscribers to the same.

The Yokohama branch of the bank will pay upon the credit balance of these funds interest at the rate of 3 per cent per annum, and on sums transferred to China, the local branches will pay the interest that is customary on such accounts. The bank will retain, at the disposal of the director general, all sums realized from the sale of the bonds, with the interest thereon, deducting, however, the sums necessary for the payment of interest upon this loan and commissions upon such payments during the period of construction of the road. In the case of payments exceeding 200,000 yen, the director general must advise the bank 10 days before effecting the payment. The entire loan is to be expended for the building of the railway in proportion to the progress of the work and as need may arise, for which written requisitions must be presented to the bank, signed by the director general and the chief accountant, with a statement attached, showing in detail the object of the disbursement, and specifying the cost. Every month the appropriations for the building of the railway will be remitted to Shanghai according to the instructions of the director general, and will be placed to the credit of the account of the road in the said branch of the bank. The director general, in agreement with the bank, will appoint a Japanese subject as chief accountant. The chief accountant will prepare a list of the necessary Chinese and Japanese clerks for conducting the bookkeeping department, and present the same to the director general; upon his approval of the list, and upon the appointment by him of these persons, they shall be placed at the disposition of the chief accountant, for the performance of their duties under his direction. The chief accountant, under the supervision of the director general and the managing director of the road, shall have charge of all revenues and expenditures of the road during the whole term of this loan, and shall sign conjointly with the managing director of the road all documents relating to the expenditure of such sums. The accounts of the road will be kept in the Chinese and Japanese languages, according to the methods adopted for the other Chinese railways.

The management of the road will periodically publish, in the Chinese and Japanese languages, a statement showing the revenue and expenditure of the railway, for the information of the public.

ART. 15. In case the principal obtained from the floating of the present loan, together with accrued interest, is not sufficient, after deduction of the percentage necessary for the payment of the coupons, during the period of construction, for the completion of the road and for meeting the expenses connected with it, the Government must furnish, from Chinese sources, the necessary funds for the uninterrupted continuation of the work, but in case a sufficient amount is not available, the bank may issue a supplementary loan on the same terms as the loan provided for in this agreement. If upon the completion of the building of the road a surplus remains, such surplus will be carried as reserve capital, in conformity with article 18, as security for the regular payment of the principal of the present loan.

ART. 16. The building of the road and the management of the road will be entirely in the hands of the Government.

The Government will appoint the director general of the road, whose place of residence must be near the place where the road is being built, and who will be furnished with full power to act in the name of the Government within the limits of this agreement. The director general, upon agreement with the bank, will appoint as chief engineer, under contract, a Japanese subject. It will be the duty of the chief engineer, under the supervision of the director general and the managing director of the road, to make surveys, prepare plans, drawings, estimates, etc., to direct the technical part of the work, to purchase needed materials, rolling stock, etc. The chief engineer will submit for the consideration of the director general a list of the necessary Chinese and Japanese technical staff for the construction work, exactly designating their number and their functions. The director general, upon approving this list, will appoint those technicians and place them at the disposition of the chief engineer for the performance of their duties under his direction. Appointments to the minor positions, and also dismissals, will be made by the chief engineer with the consent of the director general and managing director of the road. As the construction of the separate sections of the road is completed, they will be turned over, by the chief engineer, to the director general, who will open them for operation if this is considered advisable. The traffic manager shall be a Japanese subject, and he shall discharge his duties in compliance with the instructions of the director general and the managing director of the road. The duties of the chief engineer will cease upon the completion of the building of the road. The director general shall then appoint a Japanese engineer whose duty it will be to supervise the engineering department under the orders of the

director general and the managing director of the road. The Japanese engineer and traffic manager will be appointed, under contract, by the director general, upon agreement with the bank.

ART. 17. For the purpose of guarding the railway line, there shall be maintained a Chinese guard detachment under the command of Chinese officers. All expenses connected with the maintenance of the detachment shall be paid from the amount destined for the building and maintenance of the road. The numerical strength of the detachment shall be determined by the director general upon agreement with the bank. If the detachment proves to be insufficient, the management of the road shall request the Government to send as guards a detachment of troops of either the central or provincial Government, and the expense for their maintenance shall be borne by the corresponding authorities.

ART. 18. The income of the railway shall be deposited in the bank on either short or long term deposits, and the bank shall pay interest at rates arranged by mutual agreement between it and the Government. The expenses of operation and upkeep of the road will be paid from the revenue of the road; the net balance of the revenue will first be applied toward the payment of the principal and interest on the loan, in accordance with the annexed amortization table, and the surplus remaining after the above-mentioned payments shall be held at the free disposal of the director general.

After the completion of the building of the line and its opening to traffic, the amounts designated for the payment of principal and interest on the loan shall be handed over to the bank six months in advance of the dates specified in the amortization table. In case the revenue of the road is insufficient to cover the expenses for the payment of interest on the loan and the liquidation of the principal, these payments shall be secured by the means indicated in article 8 of the present agreement.

ART. 19. During the period of the building of the road, a person designated by the bank shall act as the agent of the road for the purchase abroad of all necessary building materials, rolling stock and other articles. The more important of these purchases will be made by the director general by means of tenders. It will be the duty of the agent, who will act as middleman, to furnish the required materials on the terms most advantageous to the road, and as compensation for this service he shall retain for himself 5 per cent of the net cost of materials procured in this way from abroad. All supply contracts shall be made through the chief engineer with the approval of the director general. It shall be the duty of the agent, who will be responsible for the strictest inspection of the materials obtained, to select materials of the best quality; the management of the road has the right to refuse to accept materials if they are not in accordance with the specification previously adopted. Building materials, rolling stock, and other articles of Japanese origin will be given preference before merchandise of other origin if the Japanese merchandise is of the same quality and the same price; after Japanese materials, preference shall be given to foreign merchandise recommended by the agent. Original bills for purchases of materials, and customs certificates, must be presented to the director general; in case discounts are allowed from the established prices, these amounts must be credited to the account of the railway; the agent is required to present all vouchers, certificates of manufacturers, etc., required by the management of the road.

Aside from the above-mentioned commission the bank shall not retain for its own profit any other sums. In case the management invites, for consultation, additional experts and engineers, all expenses in this connection will be charged to the account of the road.

To encourage Chinese industry, materials and merchandise of native origin, if the qualities and prices are the same as similar goods of foreign origin, shall be given the preference; for the purchase of such merchandise, of Chinese origin, the bank shall not receive a commission. Upon the completion of the building of the road the person designated by the bank shall continue as agent of the road, for supplying necessary materials, during the whole period while this agreement is in effect, under conditions which shall be arranged later.

ART. 20. If, in the future, the Government deems it advantageous or desirable to extend the railway line or to build a branch, this work can be done with money obtained from Chinese sources; if, however, foreign capital is wanted for that object, the Government is obliged to give the preference to the bank. The length of these additional lines shall be determined by the Government.

ART. 21. The bank, being the agent of the bondholders, shall deal with the management of the road in all matters concerning the railway, as the representative of the bondholders.

ART. 22. Should any events of a political or economic character in the country during the period between the signing of the present agreement and the issuing of the prospectus of the loan, which would have an injurious effect on the money market and cause a decline in Chinese securities, and in consequence cause the bank diffi-

culty in issuing the bonds for the present loan, the Government by mutual agreement with the bank shall grant to the latter an extension of the time for carrying out the conditions of the agreement. If at the expiration of the designated time the loan has not been issued, the present agreement shall be considered as canceled. The Government in that case will repay to the bank the advance made according to article 3 of this agreement, with accrued interest, and the bank shall be entitled to no other compensation.

ART. 23. The bank is authorized, with the consent of the director general, to transfer the rights and obligations which it has obtained by this agreement, either wholly or in part to another Japanese subject, or to intrust them to another person as its attorney.

ART. 24. In order to secure a wide distribution of the bonds, the bank will be given the right to express the price of the bonds in English, French, and American currencies; the bonds will be printed in Chinese, Japanese, English, and French languages; the places of payment of the principal and interest on the loan to the holders of the bonds will be London, Paris, and New York, and the bank may issue the bonds either wholly or in part in the three cities named.

ART. 25. The present agreement, with its annexes, was ratified by the President of China on the 27th of December of the year 1915 (4th year of the Chinese Republic and the 4th year of the reign of Taisho, in Japanese chronology), regarding which an official communication was made by the Minister for Foreign Affairs to the Japanese Minister at Peking.

ART. 26. The present agreement is drawn up in four copies in the Chinese language and four copies in the Japanese language, of which three copies in each language will be delivered to the Government and one copy of each will be kept by the bank. Should it happen that there be a divergence between the texts of the Chinese and Japanese copies, the Japanese text will be given the preference.

December 27, 4th year of the Republic.

ANNEX I.

December 27, 1915 (4th year of the Republic, according to the Chinese chronology, and December 27, 1915, 4th year of the reign of Taisho, according to the Japanese chronology), the Chinese Government (hereinafter called the Government) and the Yokohama Specie Bank (hereinafter called the bank) concluded between themselves an agreement for a loan for the purpose of building a line from Sipingkai to Chengchiatun. With the object of accomplishing the earliest possible completion of operations, the parties have concluded also the following supplementary agreement. With regard to points not mentioned in the present annex, the text of the original agreement continues to be in force.

ARTICLE 1. Having regard to the fact that, in consequence of the European war, which has affected the money market most seriously, it is acknowledged that it is not feasible to issue the bonds at present, the Government, having it in view to start immediately building the Sipingkai-Chengchiatun Railway, is borrowing from the bank 3,400,000 Shanghai taels.

ART. 2. The bank reserves to itself the right to return to itself the amount advanced, with accrued interest, in accordance with the first part of article 13 of the agreement, from the amount received from the sale of bonds. The Government and the bank must decide by mutual agreement the question of the feasibility and advantageousness of issuing the bonds.

ART. 3. The present advance is destined exclusively for the expenses of building the Sipingkai-Chengchiatun Railway, which include payment for the expropriation of land, purchase of rolling stock, acquiring every kind of material and other articles required, and also the payment of interest while building and for operating the road.

ART. 4. The payment of the interest on this advance will be effected 14 days in advance of the due date, from the amount of the advance, during the period of construction of the road, and upon completion of the construction, first of all from the revenues of the road and then, in case they should be insufficient, from other Government revenues.

ART. 5. The Government guarantees punctuality in the payment of the principal and interest of the present advance; if this advance and also the revenues of the road shall not be sufficient for the payment of interest and for the liquidation of the principal, the Government will make the necessary payments from other sources.

ART. 6. Previous to the issue of the bonds of the Sipingkai-Chengchiatun Railway, the revenues of the railway, and also all property of the road, movable and immovable,

already in existence or which may belong to it in the future, shall be considered as given to the bank as security for this advance.

ART. 7. The amount of the present loan shall be paid into the Shanghai branch of the bank for account of the Sipingkai-Chengchiatun Railway, and the bank will pay the usual interest on this account. If the director general wishes to debit this account, at any one time, in a sum exceeding 200,000 taels he must inform the bank 10 days in advance.

ART. 8. The present advance will be expended in proportion to the requirements for the surveys and for the work of building the road, and the money will be paid by the bank, upon the presentation to it of a written order, signed by the director general and the chief accountant, supplemented by documents exactly designating the kind and cost of the work which is being undertaken.

December 27, 4th year of the Republic.

Minister of Finance.

Minister of Communications.

December 27, 4th year of the reign of Taisho.

Representative of the Yokohama Specie Bank.

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